Stakeholder Committee, No. 2

Minutes

Date and time: 29 February 2012 @ 11:00
Venue: Outspan Inn, Port St Johns

ACTION

1. WELCOME, OBJECTIVE AND CONSTITUTION OF THE MEETING

(a) The Chairperson, Mr Menard Mugumo (MM) opened the second SC meeting and welcomed all attendees. He outlined the objectives of the Stakeholder Meeting, which entailed:

- engaging the stakeholders;
- promoting communication and liaison;
- sharing information and progress of study; and
- initiating the public participation process, which is part of the EIA process and will commence at a later stage.

(b) MM confirmed that all interested and affected parties are welcome at the SC meeting. Sizakele Gabula (SG) indicated that he has details of people that should be added to the distribution list of the next SC meeting. — SG

(c) SG proposed that the Mayor of OR Tambo District Municipality be invited to the next SC meeting and that the venue be located within the OR Tambo District Municipality's area of jurisdiction. — HSP

2. ATTENDANCE

(a) Members introduced themselves and the organisations they represented. They were also requested to indicate any changes to their contact details. An attendance register was circulated and the completed register is attached as Appendix A.

2.2 PRESENT

Menard Mugumo	(MM)	DWA: Options Analysis South
Fanus Fourie	(FF)	DWA
Theo Geldenhuys	(TG)	DWA
Bhekokwakhe Kunene	(BK)	DWA
Andrew Lucas	(AL)	DWA
Galelo Mbambisa	(GM)	DWA
Stephen Mullineux	(SHM)	DWA
Hermien Pieterse	(HSP)	BKS
Kagiso Kwele	(KK)	BKS
J A Myburgh	(JAM)	AGES-EC
Patsy Scherman	(PS)	Scherman, Colloty associates
Lusindiso Poyo	(LP)	OR Tambo DM

David Stephen	(DS)	Umgeni Water
Ntandazo Vimba	(NV)	National Cogta
Craig Thompson	(CT)	Amatola Water
Mthokozisi Nyawose	(MN)	Amatola Water
Sizakele Gabula	(SG)	DEDEAT
Siyabulela B Mtonjeni	(SBM)	DEDEAT (ORT)
Bonile Madolo	(BM)	DEDEAT
Ntombifuthi Tshapa	(NT)	Social Development
Victoria Mantame	(VM)	Social Development

2.3 Apologies

Johan D Rossouw	BKS
Henriette Anderson	DWA
Beason Mwaka	DWA
Celiwe Ntuli	DWA
Philipe Kanise	DWA
Isa Thompson	DWA
Peter van Niekerk	DWA
Barbara Weston	DWA
L Ruleni	Dept. of Local Govern. and Traditional Affairs
T Mbangeni	Eastern Cape Development Corporation (ECDC)
S Mase	Eastern Cape Development Corporation (ECDC)
R Vorster	EC- Ugie Agricultural Cooperative
M Baphelele	ECSECC
T Mtshaulana	Eskom
S H Thoka	Land Claims Commission
O Sopela	Port St John's LM
Amanda Machimane	Provincial Department of Human Settlements
Makhosi Mthembu	Silaka Nature Reserve
N Matwasa	Tribal Authority (Zalu Dam)

3. CONFIRMATION OF THE AGENDA

(a) The following items were added to the Agenda:

- **Item 4.1**: Approval of the previous minutes
- **Item 7**: Mzimvubu study

4. MINUTES FROM THE PREVIOUS MEETING (SC 1) ON 26 MAY 2011

4.1 Approval of Minutes from SC 1 (held on 26 May 2011)

The minutes of the first SC meeting were approved with the following amendments

- Item 2.1: change Mbambiso to Mbambisa and change Stephen Mullineux's initials to SHM;
- Item 4c: change "***Implementation*** of reserve" to "***Assessment*** of Reserve";
- Item 4d: correct spelling of Scherman; and
- Item 5.3e: change Andrew ***Deacon*** to Andrew ***Lucas*** .

4.2 MATTERS ARISING FROM SC 1, 26 MAY 2011

4.2.1 Item 4e and 8b: Feedback on the appointment of EIA professional service provider

(a) MM reported that a scope of work for the EIA study was received from the BKS team and copies were given to the DWA: Environmental Study Unit for comments. It was reported that the Terms of Reference will soon be submitted to the Departmental Bid Adjudication Committee.

(b) Approval of the appointment should is expected the first quarter of the financial year (July/ August 2012).

4.2.2 Item 5.2c: Assess impact of the implementation of the ecological water requirements on dam size and assurance of supply

Hermien Pieterse (HSP) reported that the desktop ecological water requirements (EWR) were incorporated into the yield model. The final EWRs will be used to optimise the dam size.

4.2.3 Item 5.2d: Incorporate DWA feedback on hydrology and sedimentation reports

(a) HSP reported that feedback on the Hydrology and Sedimentation reports was received from the DWA, and that the feedback will be incorporated into the Water Resources report, together with the yield.

(b) In response to a question from Bhekokwakhe Kunene (BK) about the progress with the Reserve and dam size determination, Patsy Scherman (PS) replied that she will send information to the DWA Regional Office and will address the issues in her presentation. PS

4.2.4 Item 7.1j: Continued liaison between Ingquza Hill Study and Lusikisiki Feasibility Study

Discussed under **Item 6**.

4.2.5 Item 8c: Make reports available prior to next Stakeholder Committee meeting

MM reported that this has not been possible as all reports are still drafts, but that they will be distributed once finalised. HSP noted that the final reports will be published on the DWA website. HSP

5. PROGRESS

5.1 INTRODUCTION AND GENERAL PROGRESS

(a) HSP presented the study programme and progress, outlining the following points in the attached presentation:

- Current abstraction from Xura River is not reliable as it is directly from the river.
- Reserve at the proposed Zalu Dam will be implemented after the dam is built.
- The study area covers parts of the Ingquza Hill and Port St Johns Municipalities.
- The study was commissioned by the DWA. It is managed by the DWA and the Project Management Committee, with input from the SC.
- An overview of progress to date on each module.
- The main deliverable for DWA is the Record of Implementation Decisions, which is a handover document between planning and implementation.

(b) The determination of the viability of irrigation has been undertaken, as presented at the previous SC meeting.

(c) The study area is between Port St Johns (south), Msikaba River (north) and is approximately 30 km inland, covering parts of the Port St Johns and Ingquza Hill municipalities. Umgeni Water has been appointed by the OR Tambo District Municipality as Principal to procure professional services and supervise the Ingquza Hill detailed feasibility study (discussed under **Item 6**).

(d) In terms of stand-alone groundwater schemes, the biggest possible supply area will be served from Zalu Dam, but since Zalu Dam is relatively small, groundwater is also considered. Jan Myburgh (JAM) noted that existing stand-alone schemes in the study area will also be taken into account.

(e) NV asked for the timeframe of the study and HSP noted that it is three years and that the project is half way, but that an extension of the study period may be requested. MM explained that recent changes to the National Treasury procurement policy delayed in the process of appointing the geotechnical contractor. Once the implementation period is due to start, detail design will require approximately one year, and construction will take approximately three years.

(f) NV suggested that the project be renamed to Ingquza Study instead of Lusikisiki RWSS. MM explained that the official DWA study name was "***Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme***" and renaming it would require approval. In addition, the name change may create confusion with the OR Tambo study.

5.2 Module 2: Water Resources: Hydrology, Sedimentation and Yield

(a) HSP reported that flow gauge T6H004 on Xura River was added to the hydrology. HSP explained the potential sedimentation that will result in the Zalu reservoir, as well as how the yield analysis was set up using the Water Resources Yield Model (WRYM). Both sedimentation and yield modelling are explained in the attached presentation.

(b) SG reported that they have received afforestation applications. HSP and PS are to obtain the information from SG. HSP/PS

5.3 Module 3: Groundwater Augmentation

(a) JAM reported on the progress on the groundwater investigation - see presentation attached in **Appendix B**. The presentation included some of the following points:

- The abstraction and incorporation of groundwater data for Lusikisiki study area;
- The locations of boreholes and springs were indicated on maps;
- A meeting was held with BKS to correlate data;
- There is sufficient groundwater, but it cannot necessarily supply the whole project due to aspects such as water quality, infrastructure and O&M complexities;
- The DWA has undertaken a groundwater Reserve determination for Water Management Area 12.

(b) Reports will be submitted to the DWA in March 2012.

(c) JAM indicated that wetlands linked to springs were studied at as part of the groundwater reserve determination process but the wetlands cover in general small areas and should rather be referred to as seepage zones.

(d) JAM noted that one or two of the boreholes have been equipped during other projects and that there are about 12 boreholes in the Lusikisiki area, but not all of them are operational.

(e) MM noted that the area to the south-west of Lusikisiki was unlikely to be supplied from the Zalu Dam and it should be supplied from boreholes. JAM added that proposals will be provided for in the recommendations of the final report regarding the south-western area. JAM

(f) JAM noted that the task team of this module conducted an interactive workshop as part of their groundwater awareness campaign with a view to improving people's knowledge, attitudes and perceptions of groundwater. The workshop was named *the Community-Groundwater Inter-Dependency Study*. The posters that were distributed at schools were shown to the SC. The campaign was held only in the study area and not throughout the OR Tambo District Municipality's area.

(g) Fanus Fourie (FF) commented that even though this study focusses on the supply area from the proposed Zalu Dam, there must be a solution for the rest of the study area and the OR Tambo District Municipality. MM stated that there are other schemes that are not part of Zalu Dam that are operated by OR Tambo District Municipality.

5.4 Module 4: Reserve

(a) Patsy Scherman (PS) presented progress undertaken on the Reserve determination. The presentation (attached in **Appendix B**) included the following among others:

- A discussion of the ecological Reserve and what it specifies
- The levels of the Reserve, and distinction between the level of reserve and confidence
- The ecoclassification process
- Ecological importance and sensitivity
- Models used for ecoclassification
- Setting flow requirements
- Final flow requirements
- Reserve process
- The site selection and surveys

(b) Due to time constraints, PS could not take questions and suggested that questions be e-mailed to her. PS/All

5.5 Module 6: Water Services Infrastructure

5.5.1 Bulk Distribution infrastructure

HSP reported on the progress, referring to the water requirements, the water balance for the planning area and the way forward, shown on the attached presentation in **Appendix B**.

5.5.2 Water Quality: Review of surface water quality data

HSP reported that six grab samples were taken from the Xura River upstream of the proposed Zalu Dam, and that the results indicated that the quality of water from the proposed Zalu Dam would generally be good. Water quality data is shown in the attached presentation.

5.6 Module 10: Environmental Screening

HSP gave an overview of the environmental impacts that will be addressed during the Environmental Impact Assessment.

5.7 OTHER MODULES

Modules 7, 9,12, 13 and 14 will start soon.

6. INGQUZA HILL LM DETAILED FEASIBILITY STUDY

David Stephen (DS) reported that there has been no progress on the approval of the ToR and subsequent procurement of a consultant for the Ingquza Hill Feasiblity Study.

7. GENERAL

DWA/OR Tambo

(a) Victoria Mantame (VM) reported that there is a lack of services (such as electricity, water and telephones) in the Ingquza Local Municipality area. HSP responded that Zalu Dam will improve the reliability of water resources, but OR Tambo District Municipality should address service delivery.

OR Tambo

(b) The Lusikisiki College is affected by the lack of services and water supply. TG explained that the college did not communicate with the Local Municipality their water requirements and that it has an illegal connection. Galelo Mbambisa (GM) will liaise with the college and OR Tambo District Municipality to find a solution.

GM/OR Tambo / Lusiksiki College

(c) MM noted that the Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply Scheme will assess the water distribution and supply infrastructure for the responsible Water Services Authority to upgrade.

(d) Ntombifuthi Tshapa (NT) enquired about the impact of the project on social development projects. Projects upstream of the dam will not be affected; however, the requirements of projects downstream of the dam must be added to the total water requirements.

(e) PS added that goods and services will be identified with the Reserve and that the issue will be flagged and looked at when the relevant module is undertaken.

(f) MM added that the social development projects fall within the small pockets of irrigable areas and should be integrated.

7.2 MZIMVUBU STUDY

MM reported that the Feasibility Study for the Mzimvubu Water Project had just started.

8. THE WAY FORWARD

HSP noted that the way forward for the relevant modules was discussed under **Item 5: Progress**.

9. DATE FOR NEXT MEETING

(a) The date of the next SC meeting was proposed for October/ November 2012 when several deliverables are expected. Alternative dates will be circulated to accommodate all members of the Committee.

10. CLOSURE

The meeting adjourned at 14h51.

Minutes certified as correct and final

H S Pieterse	26/2/2013		26. 2. 2013
Study Leader	Date		

Appendix A

Attendance Register

Feasibility Study for Augmentation of the Lusikisiki Regional Water Supply

Stakeholder Committee

ATTENDANCE REGISTER - 29 February 2012

	Initials	Name	Surname	Company / organization	Telephone number	Fax number	Cellphone number	E-Mail address
Mrs	H	Hennette	Anderson	Department of Wate	012 336 8511		082 807 4335	andersonh@dwa.gov.za
Mr	N		Baai	Umgeni Water	033 846 1830	033 846 1830		ntsiki.baai@umgeni.co.za
Mr	M		Baphelele	Eastern Cape Socio	043 701 3400	043 701 3415		bapholele@ecsecc.org
	N	Nozithembiso	Dzedze					
Mr	M		Fihlani	Ingquza Hill Local M	039 252 0131	039 252 0279		nmdiya@ihlm.gov.za
Mr	F	Fanus	Foune	Department of Wate	012 336 7303	012 336 0831	082 801 5598	fourief@dwa.gov.za
Mr	T	Theo	Geldenhuys	Department of Wate	048 881 3005	048 881 3565	082 808 0499	geldenhuyst@dwa.gov.za
Ms	N		Hackula	Prov. Dept of Social	043 605 5012	043 605 5470		Bongiwe.mbomboshe@soc
Ms	S		Hesjebal	Eastern Cape Socio	043 701 3400	043 701 3415		siv@ecsecc.org
Mr	Z		Hewu	Port St John's Local	047 564 1374	047 564 1374	082 577 8971	zhewu@psjmunicipality.co..
Mr	P	Phillips	Kanise	Department of Wate			043 604 5400	kanisep@dwa.gov.za
Mr	S	Sifiso	Khoza	OR Tambo District n	047 501 6400			sifisok@ortambodm.org.za
Mr	C	Charles	Kumbula	OR Tambo	047 501 6447		083 483 3494	charles@yahoo.com
Mr	B	Bhekokwakhe	Kunene	Department of Wate	(043) 701 0272	0865515130	072 370 9784/08	kuneneb@dwa.gov.za
Ms	K		Kwele	BKS	(012) 421 3731		073 649 5678	kagisok@bks.co.za
Mr	A	Andrew	Lucas	Department of Wate	043 604 5403	043 604 5592	082 802 8564	lucasa@dwa.gov.za

	Initials	Name	Surname	Company / organization	Telephone number	Fax number	Cellphone number	E-Mail address
	P		Lusindiso					lusindisop@webmail.co.za
Ms	A		Machimane	Provincial Departme	043 604 5536	082 909 9505	082 909 9505	machimanea@dwa.gov.za
Mrs	Z Z		Machingwane	Prov. Dept of Health	040 608 1135	040 608 1134		zukiswa.machingwane@im
Mr	N		Mafumbatha	Eskom (Eastern Ca	043 703 2210		072 426 8298	mafumba@eskom.co.za
Ms	E		Mampane	National Departmen	012 319 7463	012 329 5936		esthermam@daff.gov.za
Mr	V		Mapiya	Mkhambathi Nature	039 306 9000	086 546 2765	079 496 782	vuyani.mapiya@ecpta.co.z
Mr	S		Mase	Eastern Cape devel	043 704 5611	043 743 8431	083 410 2359 (S	smase@ecdc.co.za
Ms	P		Mashiane	National Departmen	012 421 1311	012 341 8513		pekane.mashiane@dhs.go
Ms	M		Matiso	OR Tambo District r	047 501 6420	047 532 2834		mandisam@ortambodm.or
Mrs	S		Matthews	Agri Eastern Cape	041 363 1890	041 363 1896		sharlene.matthews@agrie
Mrs	N		Matwasa	Tribal Authority (Za			084 682 2733	
Mr	G	Galelo	Mbambisa	Department of Wate	043 604 5407	043 604 5992	083 627 5929	mbambig@dwa.gov.za
Mrs	T		Mbangeni	ECDC	039 254 0854	043 743 8431	073 458 2940	tmbangeni@ecdc.co.za
	M	Mzukisi	Mbete					
Mrs	N	Nolwazi	Mdoda	Eskom	047 531 0475	083 750 8028	083 750 8028	mdodan@eskom.co.za
Mr	Z		Memela	Land Claims Comm	043 743 3824	043 700 6113	082 419 5297	zzhmemela@ruraldevelopn
	-		Mini	Department of Wate	043 701 0208	043 722 6152	072 643 9006	mini@dwa.gov.za
Mr	J		Moller	AgriSA	012 643 3400	012 663 3178		moller@lantic.net
Mr	E		Mthembu	National Departmen	012 310 3230	012 320 7539		emthembu@environment.g

	Initials	Name	Surname	Company / organization	Telephone number	Fax number	Cellphone number	E-Mail address
Ms	M		Mthembu	Silaka Nature Reser	047 564 1177	086 546 2767		makhosi.mthembu@ecpta.
	S		Mtonjeni	DEDEA (ORT)	047 531 1191	047 531 2857		siyabulela.mtonjeni@deaet
Mr	T		Mtshaulana	Eskom	047 531 2242	086 662 1105	073 104 3566	mtshaut@eskom.co.za
Mr	M	Menard	Mugumo	Department of Wate	012 336 6838	012 336 7399	082 804 5162	mugumom@dwa.gov.za
Mr	S	Stephen	Mullineux	Department of Wate	048 881 3005	048 881 3545	082 809 5687	mullineuxs@dwa.gov.za
Mr	B	Beason	Mwaka	Department of Wate	012 336 8188			mwakab@dwa.gov.za
Mr	JA	Jan	Myburgh	AGES-EC	043 726 2070	043 726 9232	083 273 6480	jmyburgh@ages-group.com
Mr	E		Mzayiya	OR Tambo District r	047 501 6443	047 532 4166/ 086		mzayiyae@ortambodm.org
Mr	B		Nelana	Provincial departme	043 605 7004	043 605 7304		sisanda.fiyani@deat.ecape
Mr	M		Nomandindi	Ingquza Hill Local M	039 253 1602	039 253 1666		
Mrs	C	Celiwe	Ntuli	Department of Wate	012 336 6838		082 885 1942	ntulic@dwa.gov.za
Mr	M	Mthokozisi	Nyawose	Amatola Water	043 707 3700	043 707 3701/ 375		mnyawose@amatolawater.co.za
Mrs	H	Hermien	Pieterse	BKS	012 421 3628	012 421 3698	082 564 3638	hermienp@bks.co.za
	Z	Zukile	Pityi					
Mr	L	Lucindi	Poyo	Ingquza Hill Local M	0391605		073 141 0505	lucindicop@webmail.co.za
Mr	J	Johan	Rossouw	BKS	012 421 3594	012 421 3698	082 337 0670	johanr@bks.co.za
Mr	L		Ruleni	Provincial Dept of L			083 727 4379	lizor@cogta.gov.za
Mr	C		Sangqu	ASGISA EC	043 735 1673	043 735 2679		chuma@asgisa-ec.co.za
Ms	P	Patsy	Scherman	Scherman, Colloty a			082 564 6078	patsy@hsm.co.za
Mr	M		Sogoni	Provincial Premier's	040 609 6382	082 788 7725	082 788 7725	bebalwa.shushu@otp.ecpr

	Initials	Name	Surname	Company / organization	Telephone number	Fax number	Cellphone number	E-Mail address
Mr	O		Sopela	Port St John's Local	047 564 1208	047 564 1206	079 890 4517	osopela@psjmunicipality.
	N	Ntsikelelo	Sovasi					
Mr	A	[illegible]	Starkey	Department of Wate	043 604 5400	043 642 3647	082 809 5892	starkeya@dwa.gov.za
Mr	D	David	Stephen	Umgeni Water	033 341 1237	033 341 1218	[illegible]	david.stephen@umgeni.c
	S		Thoka	Land Claims Comm	043 743 3824	043 700 6113	082 827 0608	shthoka@ruraldevelopme
Mr	C		Thompson	Amatola Water	043 707 3700	043 707 3701/ 37	082 335 1256	cthompson@amatolawate
Mr	I	Isa	Thompson	Department of Wate	012 33 68647		082 805 2158	thomposoni@dwa.gov.za
Mr	F	Francios	Van der Merwe					francios@dwa.gov.za
Mr	P	Peter	Van Niekerk	Department of Wate	012 336 8762	012 323 1532	082 807 4981	vanniekerkp@dwa.gov.za
Mr	N		Vimba	~~Provincial Dept of L~~ National COGTA			079 505 5368	ntandazov@cogta.gov.za
Mr	R		Vorster	East-Cape- Ugie Ag	043 831 1011			komga@ocac.co.za
Mrs	B	Barbara	Weston	Department of Wate	012 336 8221		083 631 0801	westonb@dwa.gov.za
Mr	L		Zuma	Cogta			072 268 4655	luckyz@cogta.gov.za
	C		Zungu	Department of Wate	047 532 6386	047 532 5752	082 324 8624	nczunguc@dwa.gov.za
Mr	C	Craig	Thompson	Amatola Water	043-7073700	043-7073701	082 5501559	cthompson@amatolawater.co.za
MR	S	SIZAKELE	GASULA	DEDEAT	0475311191	0475312887	[illegible]	sizakele.gasula@[illegible]
Ms	B.	BONILE	MADOLO	DEDEAT	0475311191	0475312887	071 577 1827	bonile.madolo@ecape.gov.za
Miss	N	[illegible]	Tonapo	Soc Dev	–	–	[illegible]	–
Ms	V.D	Victoria	Mantame	Social Dev.	–	[illegible]	[illegible]	victoria.mantame@socdev.[illegible]

Appendix B

Progress report presentation

Study for Augmentation of the Lusikisiki Regional Water Supply Scheme

Stakeholder Committee 2

29 Feb 2012

www.dwa.gov.za/Projects/Lusikisiki

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

BKS

Objective of the SC meetings

- Policy of DWA to engage with stakeholders:
  - From local, provincial and national level
  - Institutions/bodies with a direct interest in the Scheme
- To promote communication and liaison
- Share information and progress of study
- Initiation of ***Public Participation*** process of EIA

29 Feb 2012 Lusikisiki Feasibility Study 2

Agenda

1. Welcome & Objective
2. Attendance
3. Confirmation of the Agenda
4. Matters arising
5. Progress
   - Introduction and general progress
   - Water resources
   - Groundwater augmentation
   - Reserve
   - Water Services infrastructure
   - Environmental Screening
6. Ingquza Hill LM Detailed Feasibility Study
7. General
8. The way forward
9. Date for Next Meeting

29 Feb 2012 Lusikisiki Feasibility Study 3

4. Matters arising

29 Feb 2012 Lusikisiki Feasibility Study 4

5. Progress

29 Feb 2012 Lusikisiki Feasibility Study 5

5.1 Introduction and general progress Objectives of Feasibility Study (1)

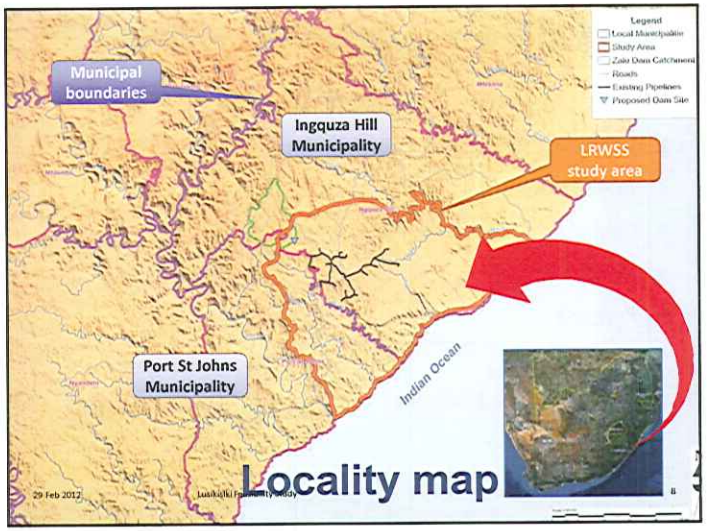
- To complete a *comprehensive engineering* investigation at the feasibility level of the possible *Zalu Dam* in the Xura River,
- To define the most attractive composition and size of the water supply components, *including augmentation from groundwater* resources.
- To supply the *increasing water requirements* for Lusikisiki and the surrounding rural villages

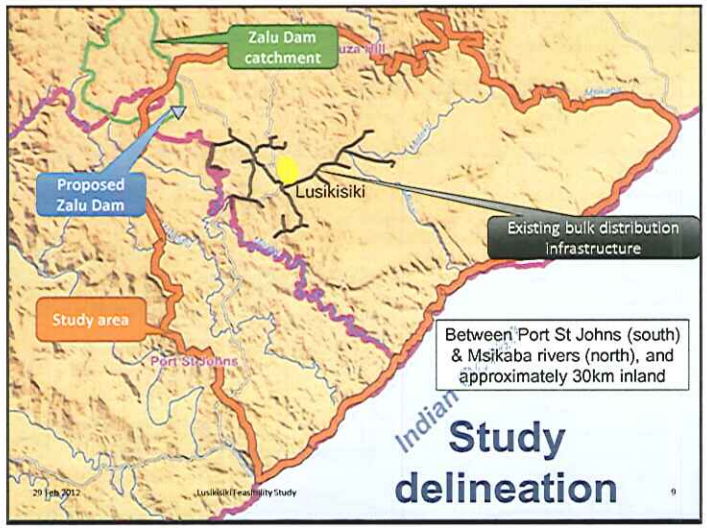
29 Feb 2012 Lusikisiki Feasibility Study 6

5.1 Introduction and general progress Objectives of Feasibility Study (2)

- To develop a *safe and reliable water source* from both surface and groundwater sources (conjunctive use)
- Minimize consequences of future water shortages
- Augment and expand the existing regional bulk system
- Assess potential for *development of irrigation*
- Assessment of the *Reserve*

29 Feb 2012 Lusikisiki Feasibility Study 7




Zalu Dam catchment
Proposed Zalu Dam
Lusikisiki
Existing bulk distribution infrastructure
Study area
Port St Johns
Between Port St Johns (south) & Msikaba rivers (north), and approximately 30km inland
Indian
Study delineation
29 Feb 2012
Lusikisiki Feasibility Study
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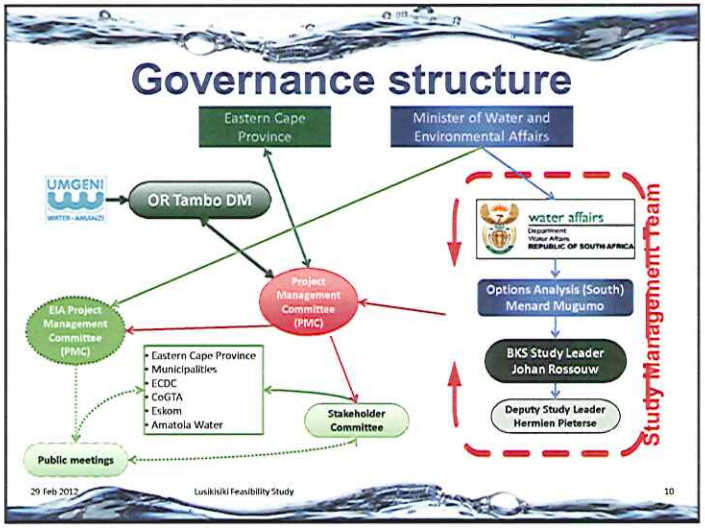
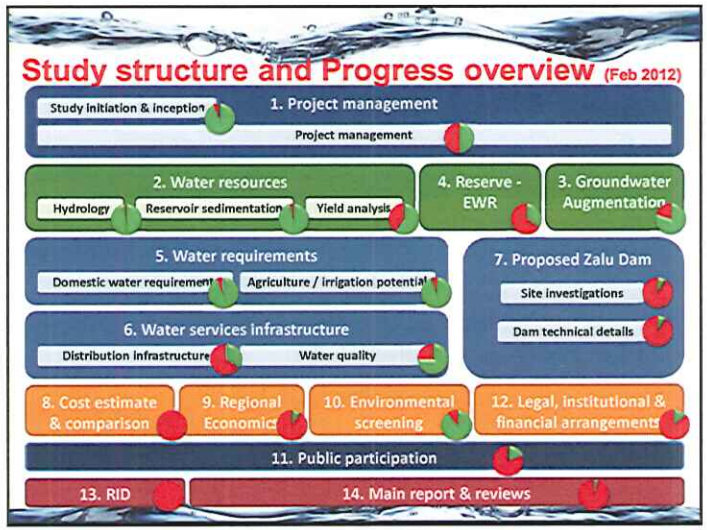
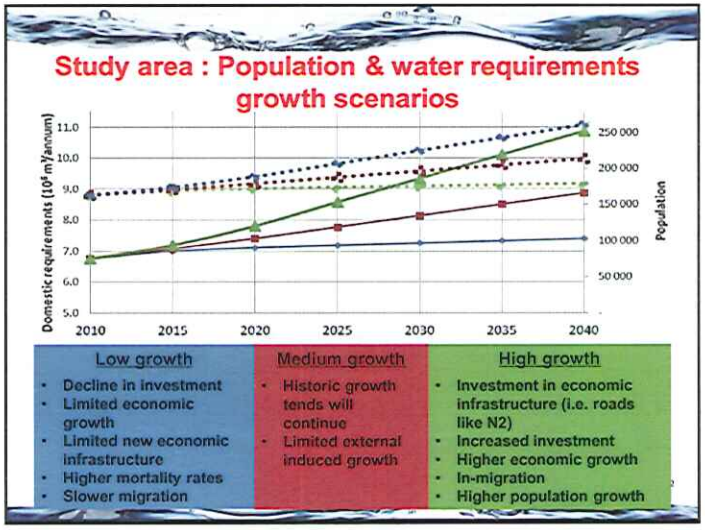
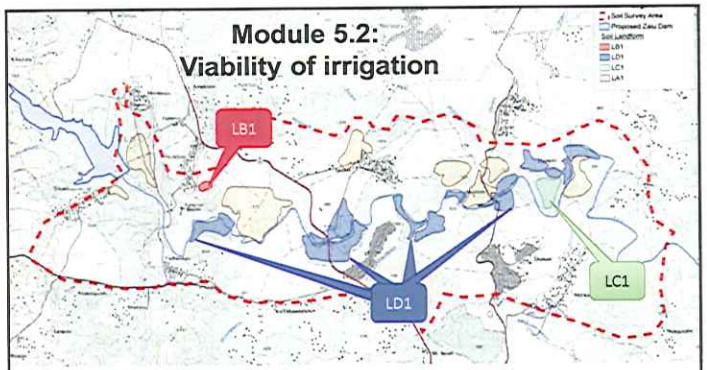

Governance structure
Eastern Cape Province
Minister of Water and Environmental Affairs
UMGENI WATER - AMANZI
OR Tambo DM
water affairs
Department: Water Affairs
REPUBLIC OF SOUTH AFRICA
Project Management Committee (PMC)
EIA Project Management Committee (PMC)
Options Analysis (South) Menard Mugumo
BKS Study Leader Johan Rossouw
Deputy Study Leader Hermien Pieterse
Study Management Team
Eastern Cape Province
Municipalities
ECDC
CoGTA
Eskom
Amatola Water
Stakeholder Committee
Public meetings
29 Feb 2012
Lusikisiki Feasibility Study
10


Study structure and Progress overview (Feb 2012)
Study initiation & inception
1. Project management
Project management
2. Water resources
Hydrology
Reservoir sedimentation
Yield analysis
4. Reserve - EWR
3. Groundwater Augmentation
5. Water requirements
Domestic water requirement
Agriculture / irrigation potential
7. Proposed Zalu Dam
Site investigations
Dam technical details
6. Water services infrastructure
Distribution infrastructure
Water quality
8. Cost estimate & comparison
9. Regional Economics
10. Environmental screening
12. Legal, institutional & financial arrangements
11. Public participation
13. RID
14. Main report & reviews


Study area : Population & water requirements growth scenarios
Domestic requirements (10⁶ m³/annum)
11.0
10.0
9.0
8.0
7.0
6.0
5.0
2010
2015
2020
2025
2030
2035
2040
250 000
200 000
150 000
100 000
50 000
Population
Low growth
Decline in investment
Limited economic growth
Limited new economic infrastructure
Higher mortality rates
Slower migration
Medium growth
Historic growth tends will continue
Limited external induced growth
High growth
Investment in economic infrastructure (i.e. roads like N2)
Increased investment
Higher economic growth
In-migration
Higher population growth

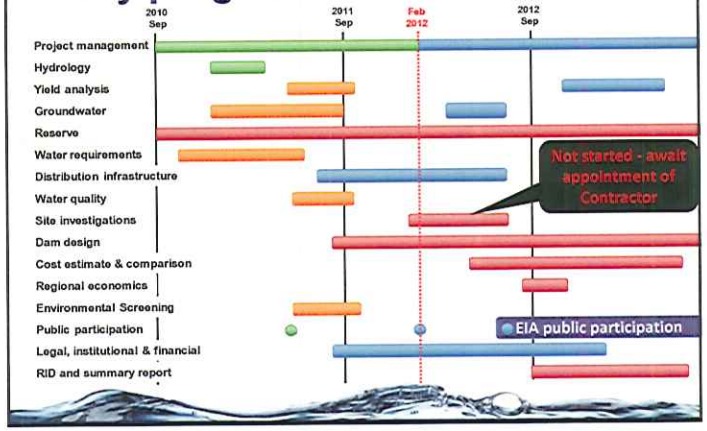
Module 5.2: Viability of irrigation



- LB1 = 5.4 ha, good potential, place well above dam
- LC1 & LD1 = 270 ha moderately to marginally suitable
  - Expert opinion 50% available area is irrigable : 135 ha

Draft report submitted to DWA and PMC – await comments

Study programme (Feb2012)



5.2: Module 2: Water Resources

Flow gauge T6H004 on Xura River

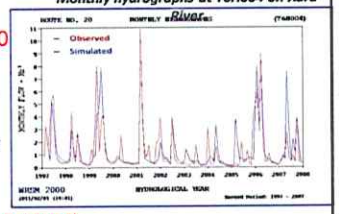
Water is pumped from the upstream pool to the Lusikisiki water purification plant

29 Feb 2012 Lusikisiki Feasibility Study 15

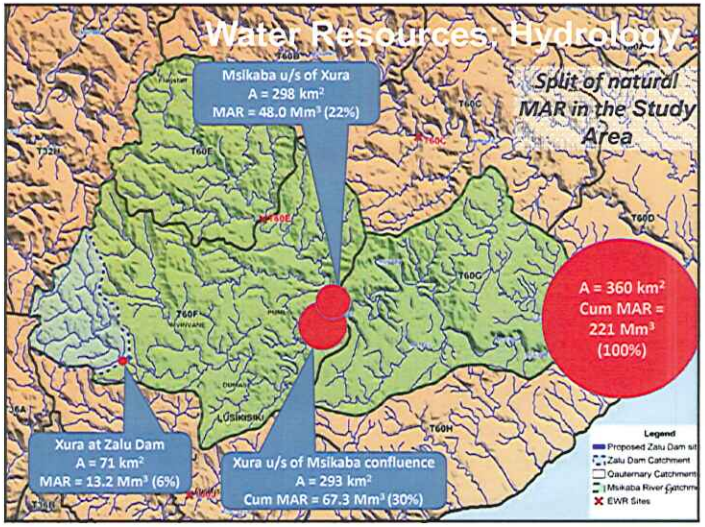
Water Resources: Hydrology

- Rainfall
  - Varies between 800 mm (inland) and 1 500 mm (coast)
- Evaporation
  - Evaporation : 1 150 mm/a
- Hydrology
  - Calibration done with WR2000 rainfall-runoff model
    - *Short flow record (10 years) at gauge T6H004 on Xura River improved the confidence of the simulated flow*
  - Results incorporated into Water Resources Yield Model (WRYM)

Monthly hydrographs at T6H004 on Xura



29 Feb 2012 Lusikisiki Feasibility Study 16



Water Resources: Sedimentation

- Estimated future sediment volume (million m³)

Confidence level	Sediment yield (million t/a)	Sedimentation period (years)				
		10	20	30	40	50
80%	0.017	0.25	0.41	0.51	0.58	0.63
90%	0.022	0.31	0.52	0.64	0.73	0.8
95%	0.027	0.39	0.65	0.8	0.9	0.99

- V_{50} between 4.7% and 7.5% of MAR

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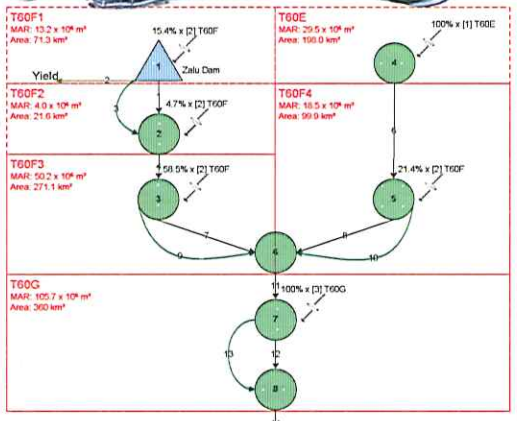
Water Resources: Yield analysis

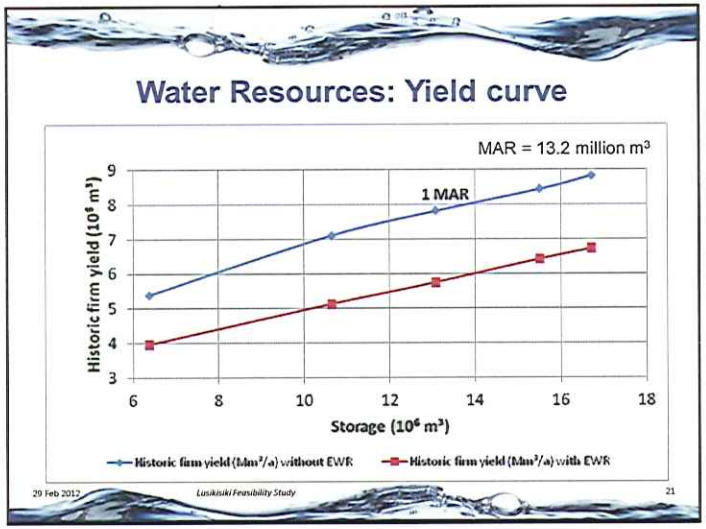
- Water Resources Yield Model (WRYM)
  - has been set up and tested
  - Historic firm yields determined for Zalu Dam
    - Without EWR
    - With EWR (1st desktop estimate)
  - can be used to assess impacts of future developments (afforestation and/or irrigation)
  - will be used to assess impact of the implementation of the ecological water requirements (Reserve) on dam size and assurance of supply

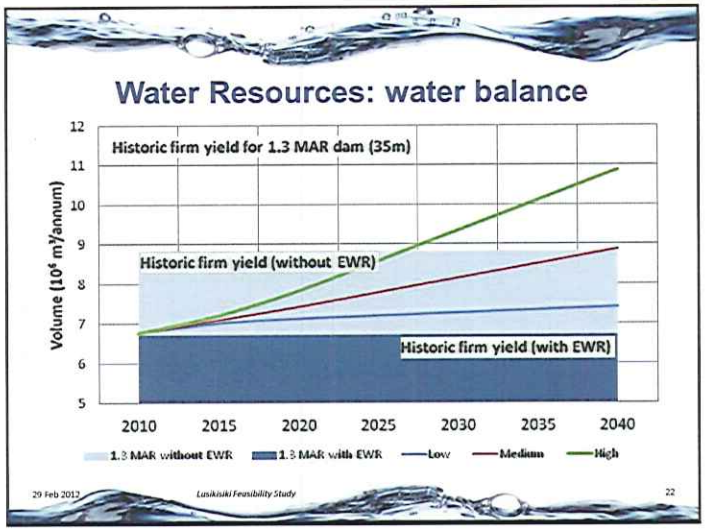
29 Feb 2012 Lusikisiki Feasibility Study 19

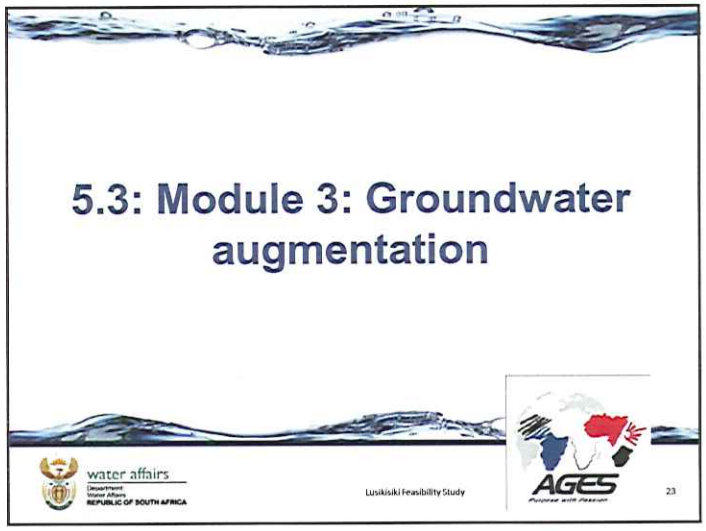
Water Resources: Yield analysis (2)

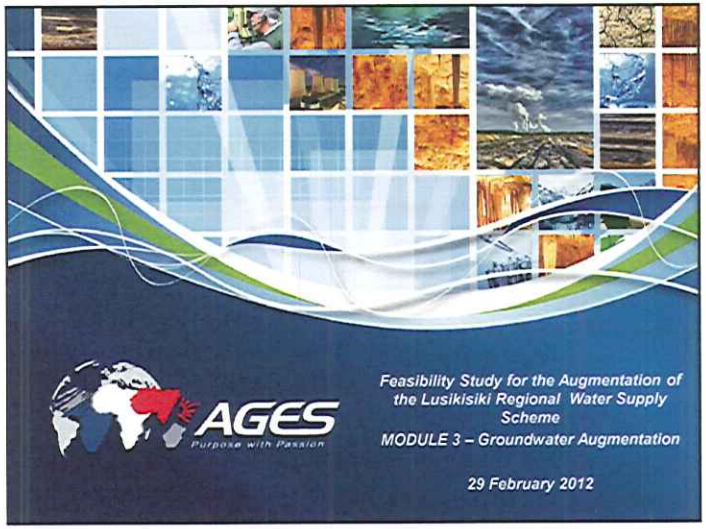


29 Feb 2012 Lusikisiki Feasibility Study 20


Water Resources: Yield curve
MAR = 13.2 million m³
1 MAR
Historic firm yield (10⁶ m³)
Storage (10⁶ m³)
Historic firm yield (Mm³/a) without EWR
Historic firm yield (Mm³/a) with EWR
29 Feb 2012
Lusikisiki Feasibility Study
21


Water Resources: water balance
Historic firm yield for 1.3 MAR dam (35m)
Historic firm yield (without EWR)
Historic firm yield (with EWR)
Volume (10⁶ m³/annum)
1.3 MAR without EWR
1.3 MAR with EWR
Low
Medium
High
29 Feb 2012
Lusikisiki Feasibility Study
22


5.3: Module 3: Groundwater augmentation
water affairs
REPUBLIC OF SOUTH AFRICA
Lusikisiki Feasibility Study
AGES
23


AGES
Feasibility Study for the Augmentation of the Lusikisiki Regional Water Supply Scheme
MODULE 3 – Groundwater Augmentation
29 February 2012

MODULE 3 – GROUNDWATER AUGMENTATION
INCEPTION STAGE

- Review of information and reports. Special emphasis on:
  - Lusikisiki Groundwater Feasibility Study, SRK 2006 / 2009
  - Eastern Pondoland Basin Study, UWP 2001
  - Groundwater Resource Information Project (GRIP)
- Interaction with task leaders to quantify the domestic water demands and existing infrastructure in relation to the groundwater potential as well as to define the ISD structure for the study
- Development and final definition of the hydrogeological terms of reference

MODULE 3 – GROUNDWATER AUGMENTATION
DESKTOP STUDY

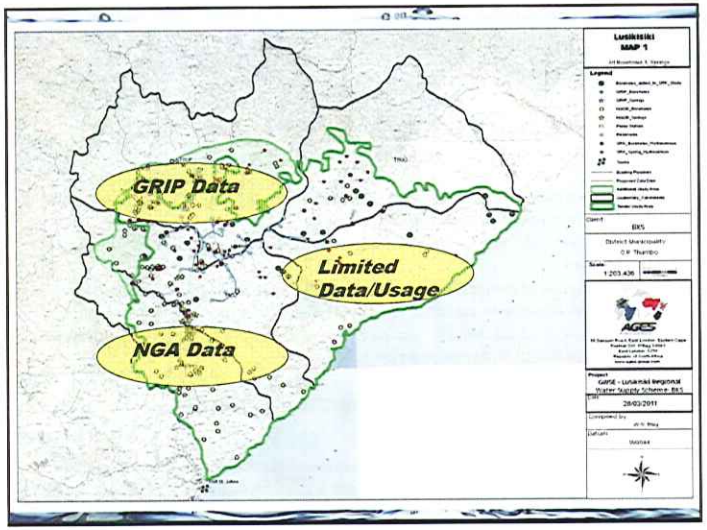
- The continued review of existing information and reports for the compilation of borehole and groundwater use statistics
- Delineate and rank known groundwater resources (aquifers), as defined in earlier studies
- Evaluation of groundwater vs surface water availability and infrastructure to define conjunctive use areas with special reference to the Zalu Dam.
- Evaluation of groundwater quality and possible treatment/blending scenarios as part of the groundwater potential assessment
- Preliminary analytical groundwater flow balances
- Cost curves for groundwater augmentation to surface water supply

MODULE 3 – GROUNDWATER AUGMENTATION
GROUNDWATER – COMMUNITY INTERDEPENDENCY SURVEY

- Assessment of community dependencies and attitudes towards groundwater
- Assessment of regional groundwater use and infrastructure statistics
- Integration of survey outcomes with groundwater augmentation planning
- Groundwater awareness creation workshops in target areas to cultivate community competencies concerning issues related to groundwater

MODULE 3 – GROUNDWATER AUGMENTATION
GROUNDWATER FLOW BALANCE & MODELING

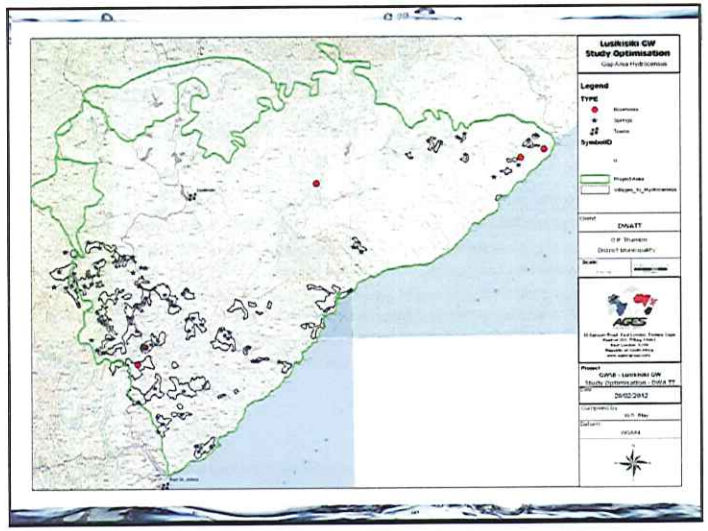
- Obtain and evaluate existing groundwater data
- Evaluate rainfall and groundwater recharge with spatial and temporal variations
- Collate and evaluate spatial land-use data, geology, surface water features and environmental components. Integration of surface water features
- Develop a regional conceptual groundwater flow model to determine interactions between surface water and groundwater with other environmental components.
- Develop analytical groundwater yield model on quaternary catchment scale in line with the groundwater component of the reserve.



MODULE 3 – GROUNDWATER AUGMENTATION

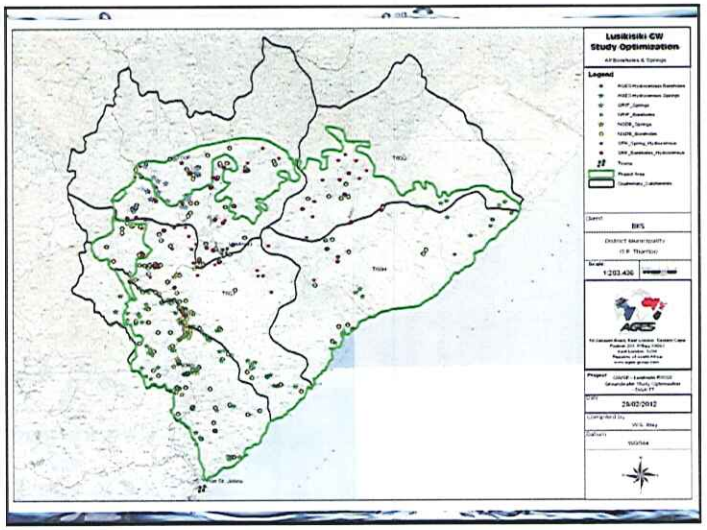
OPTIMISATION OF DATA IN GAP AREAS & SPRING CHARACTERISATION

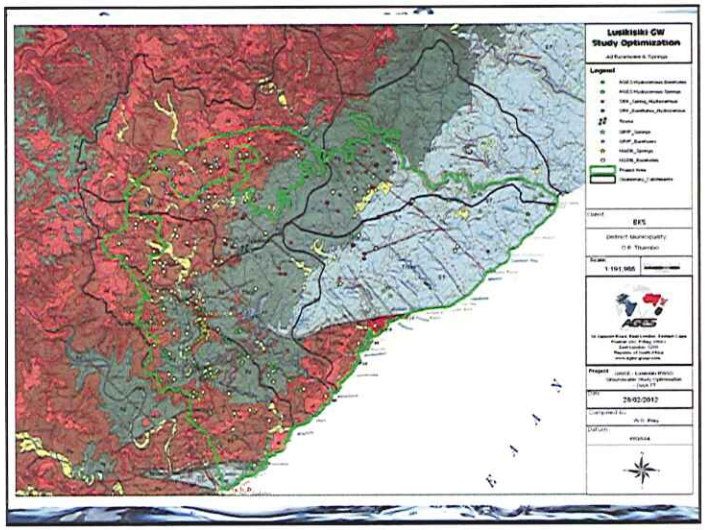
- Desk study (data base search, historical reports and data)
- Liaison & coordination (community, local authorities, civil engineers)
- Site verification and hydrocensus
- Note possible sources of groundwater pollution
- Collect water samples, where feasible, and submit to Lab for limited analysis
- Data processing and analysis
- Electronic format of borehole information for submission to DWA
- Compile status quo community report
- Spring characterisation
- Integrate data for design optimisation



GEOSITE SUMMARY

Description (Geosites in Study Area)	Total
Total nr of Boreholes in known in study area	**242**
Boreholes reflected on NGDB database	152
Additional boreholes sourced from GRIP survey	17
Boreholes identified during SRK Hydrocensus	36
New boreholes drilled during SRK study	30
Boreholes identified during DWA Hydrocensus	7
Total nr of Springs in study area	**207**
Springs reflected on NGDB database	49
Additional springs sourced from GRIP survey	22
Springs identified during SRK Hydrocensus	48
Springs identified during DWA Hydrocensus	88


Lusikisiki GW
Study Optimization
All Boreholes & Springs
Legend
BKS
1:203,436
29/02/2012


Lusikisiki GW
Study Optimization
Legend
BKS
1:191,985
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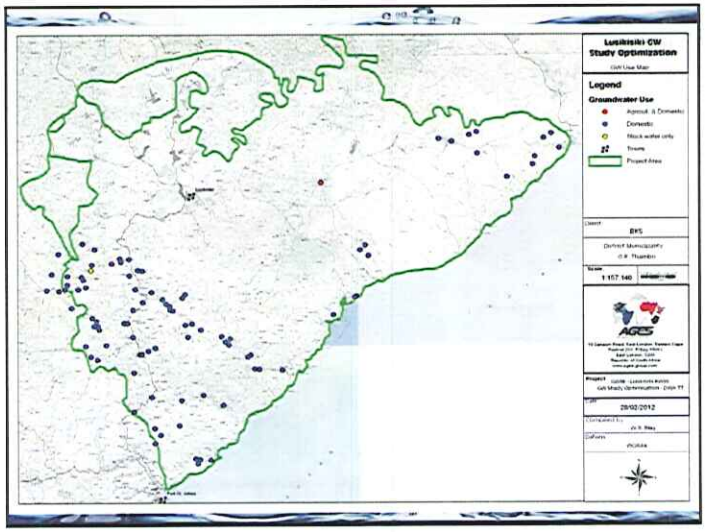
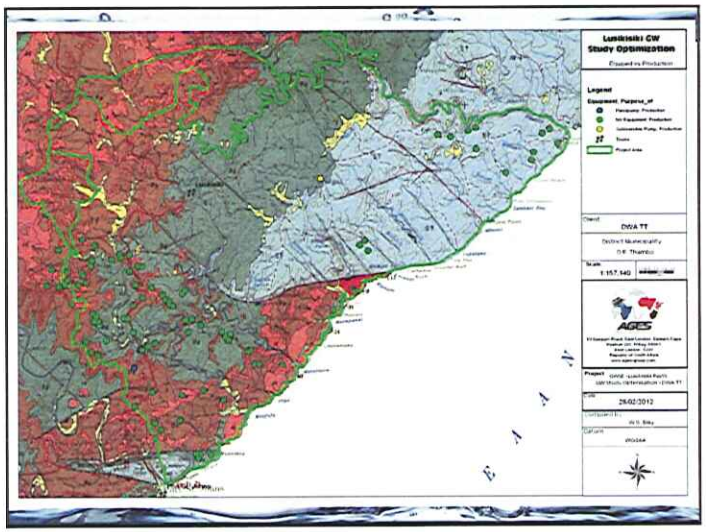
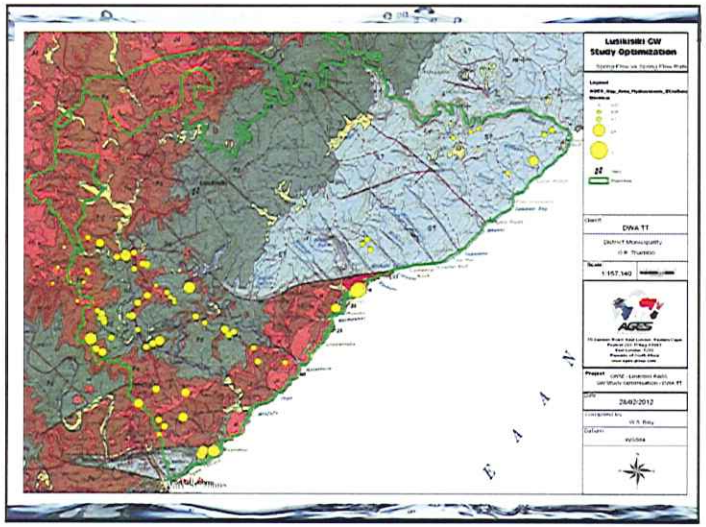
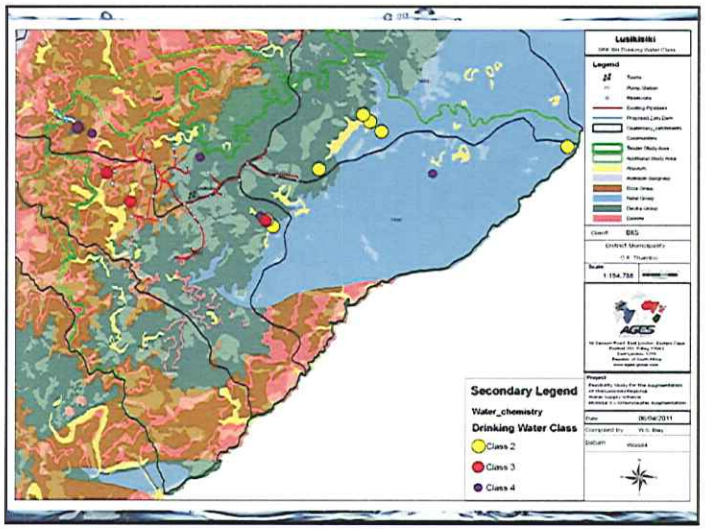
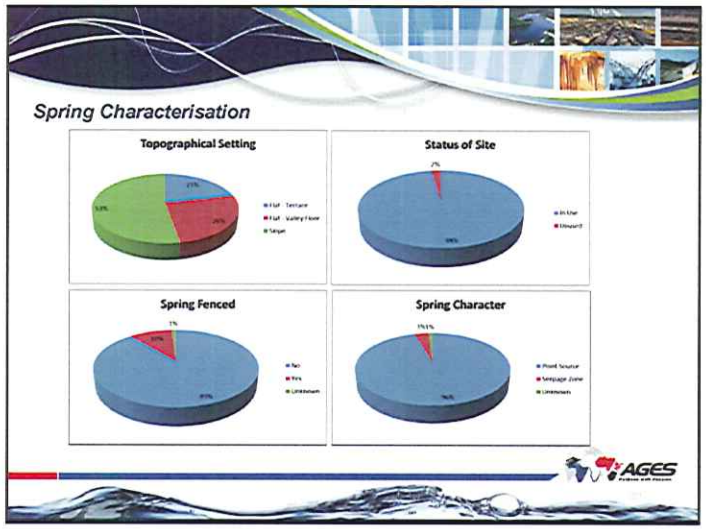
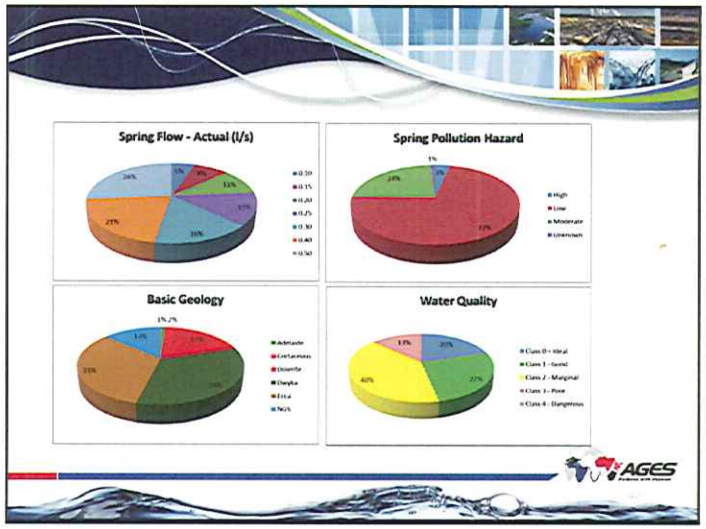

Lusikisiki GW
Study Optimization
Legend
Groundwater Use
BKS
1:157,140
29/02/2012

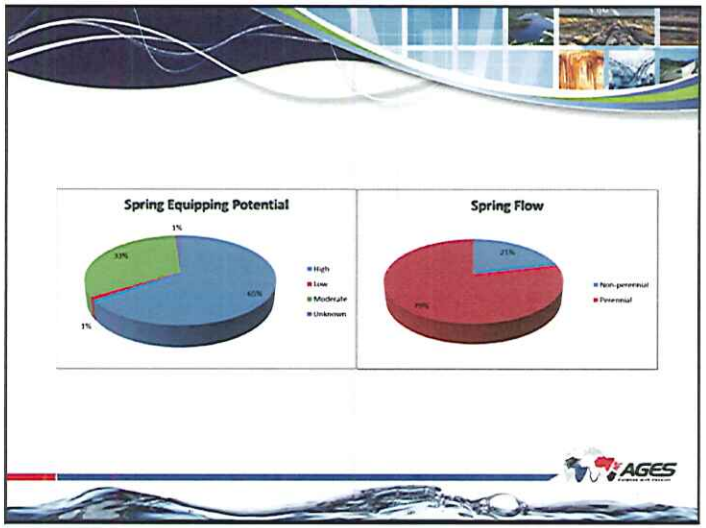

Lusikisiki GW
Study Optimization
Legend
DWA TT
1:157,140
29/02/2012

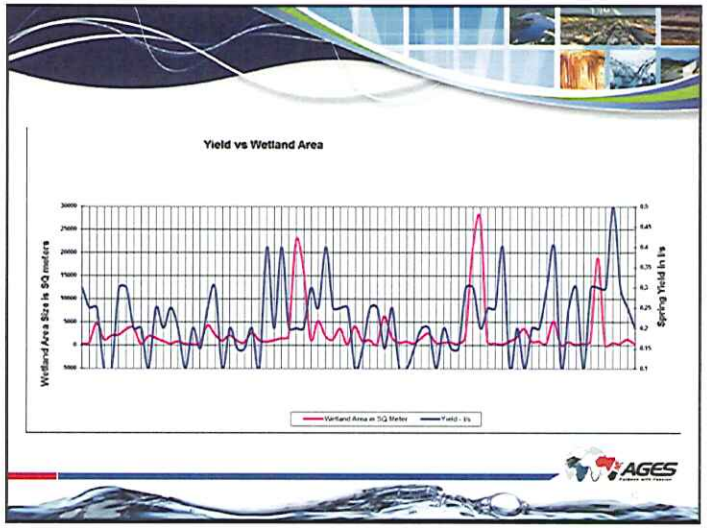

Lusikisiki GW
Study Optimization


Lusikisiki
Legend
Secondary Legend
Water_chemistry
Drinking Water Class
Class 2
Class 3
Class 4


Spring Characterisation
Topographical Setting
Status of Site
Spring Fenced
Spring Character
AGES


Spring Flow - Actual (l/s)
Spring Pollution Hazard
Basic Geology
Water Quality
AGES





GROUNDWATER YIELD MODEL FOR THE RESERVE (GYMR)

- The Lusikisiki GYMR scenarios have been completed as accurately as possible for the given scope of study and only await Ecological Water Requirement (EWR) figures for baseflow from the EWR flow requirements Module for completion
- Four scenarios were modelled in the GYMR namely:
  - Present Day conditions based on a 95% assurance of rainfall excluding general authorisations;
  - Present Day scenario based on a 95% assurance of rainfall (includes drought cycles) including General authorisation volumes;
  - Present Day Scenario based on Mean Annual Precipitation (MAP) excluding General Authorisation volumes across catchment. In the study area the 95% assured rainfall is approximately 80% of the MAP;
  - Future 2020 scenario based on 95% assurance of rainfall excluding general authorisations.

GROUNDWATER YIELD MODEL FOR THE RESERVE (GYMR)

- In all Present Day scenarios detail water use figures for 2010 were available from the Eastern Pondoland Basin Study (2001) as well as SRK Groundwater pre- feasibility study (2009).
- In the future 2020 scenario, projected 2020 figures as available in the Eastern Pondoland Basin Study were used.
- Only one stream flow gauge with approximately 10 years of reliable data was available in the study area and this data could be effectively used to determine a good estimate of the groundwater contribution to baseflow for the applicable catchment.
- The baseflow was calculated at circa 2.65% of MAP for the applicable flow gauge catchment as delineated by BKS, and this baseflow figure could be used to calibrate the model specifically for T60F.
- The Present Day 95% assured rainfall scenario, excl GAs was found to already be in good agreement with this groundwater contribution to baseflow (2.93% vs. 2.65%) and the relative differences between groundwater recharge figures are deemed to be correctly interpreted.

GYMR Present Day 95%assurance, GAs Incl.

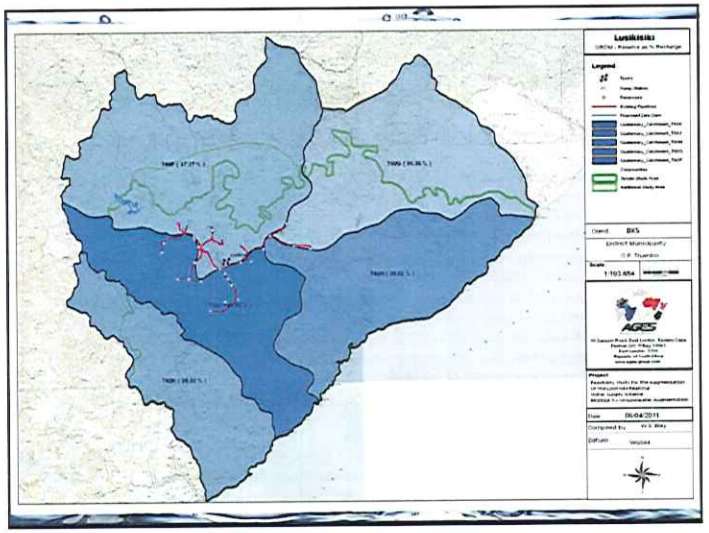
Catchment	Surface Area (km^2)	MAP WR2005 (mm/a)	95% assured Rainfall (mm/a)	Ground water Recharge (% of MAP)	Recharge (Mm^3/a)	Total inflow (Mm^3/a)	Total outflow before losses Mm^3/a	Evapo-transpiration flow loss (Mm^3/a)	Net Baseflow (Mm^3/a)	GYMR Index %(Total outflow/ Total inflow)
T60E	198	885	709	6.03%	8.47	8.47	-3.40	-2.39	2.67	40%
T60F	463	940	753	6.03%	23.13	23.13	-7.20	-5.23	10.69	31%
T60G	359	1116	895	8.29%	26.65	26.65	-7.46	-6.35	12.84	28%
T60H	322	1277	1024	9.90%	32.59	32.62	-10.58	-5.37	16.67	32%
T60J	293	1101	882	8.23%	21.31	21.31	-5.32	-4.72	11.27	25%
T60K	242	1075	862	7.50%	15.64	15.64	-4.32	-4.93	6.39	30%
Total study area	1151	1114	893	8.25%	84.77	84.81	-10.61	-20.49	53.71	13%

GYMR Present Day 95%assurance, GAs Incl.

Quaternary catchment	Potential stressed status total outflow before ET losses as % of inflow	Total L/s available
T60E	40%	-94.7
T60F	31%	-339.1
T60G	28%	-407.1
T60H	32%	-528.5
T60J	25%	-357.4
T60K	30%	-202.7
Total study area	13%	-1703.3

GRDM Stress index - GYMR Index - GAs Incl.

Criticall	Highly stressed	Moderately stressed	Moderately stressed	Slightly stressed	Unstressed
F >96%	E 66% - 95%	D 41% - 65%	C 21% - 40%	B 6% - 20	A 0% - 5%
100%	95%	65%	40%	20%	5%



GYMR Present Day 95%assurance, GAs Excl.

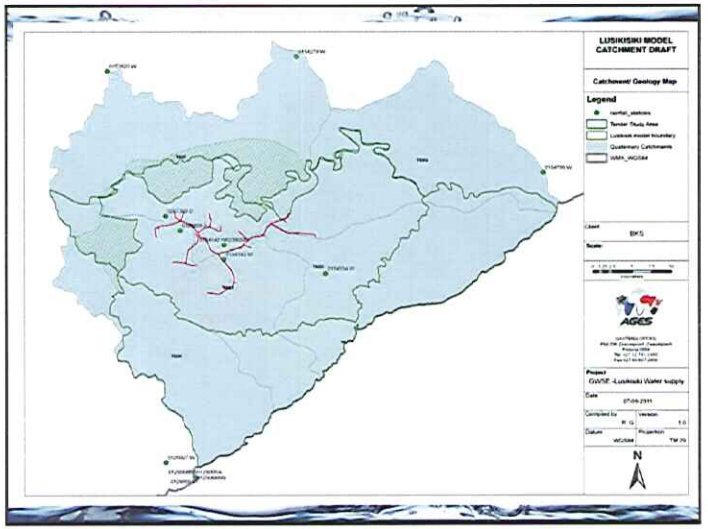
Catchment	Surface Area (km²)	MAP WR2005 (mm/a)	95% assured Rainfall (mm/a)	Ground water Recharge (%of MAP)	Recharge (Mm³/a)	Total inflow (Mm³/a)	Total outflow before losses Mm³/a	Evapo-transpiration flow loss (Mm³/a)	Net Baseflow (Mm³/a)	GYMR Index %(Total outflow/ Total inflow)
T60E	198	885	709	6.03%	8.47	8.47	-2.51	-2.39	3.56	30%
T60F	463	940	753	6.63%	23.13	23.13	-5.12	-5.23	12.78	23%
T60G	359	1116	895	8.29%	26.65	26.65	-2.06	-6.35	18.23	8%
T60H	322	1277	1024	9.90%	32.59	32.62	-5.76	-5.37	21.49	18%
T60J	293	1101	882	8.23%	21.31	21.31	-3.12	-4.72	13.47	15%
T60K	242	1075	862	7.50%	15.64	15.64	-3.23	-4.93	7.48	21%
Total study area	1151	1114	893	8.25%	84.77	84.81	-7.53	-20.49	56.79	9%

GYMR Present Day MAP, GAs Excl.

Catchment	Surface Area (km²)	MAP WR2005 (mm/a)	95% assured Rainfall (mm/a)	Ground water Recharge (% of MAP)	Recharge (Mm³/a)	Total inflow (Mm³/a)	Total outflow before losses Mm³/a	Evapo-transpiration flow loss (Mm³/a)	Net Baseflow (Mm³/a)	GYMR Index %(Total outflow/ Total inflow)
T60E	198	885	709	6.03%	10.56	10.56	-2.51	-2.39	5.66	24%
T60F	463	940	753	6.63%	28.85	28.85	-5.12	-5.23	18.50	18%
T60G	359	1116	895	8.29%	33.24	33.24	-2.06	-6.35	24.83	6%
T60H	322	1277	1024	9.90%	40.65	40.69	-5.76	-5.37	29.56	14%
T60J	293	1101	882	8.23%	26.59	26.59	-3.12	-4.72	18.75	12%
T60K	242	1075	862	7.50%	19.51	19.51	-3.23	-4.93	11.36	17%
Total study area	1151	1114	893	8.25%	105.76	105.80	-7.53	-20.49	77.78	7%

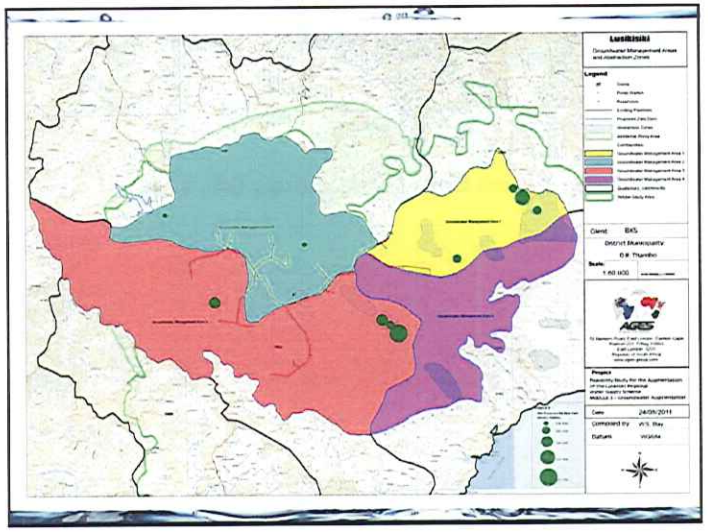
GYMR Future 2020 95%assurance, GAs Incl.

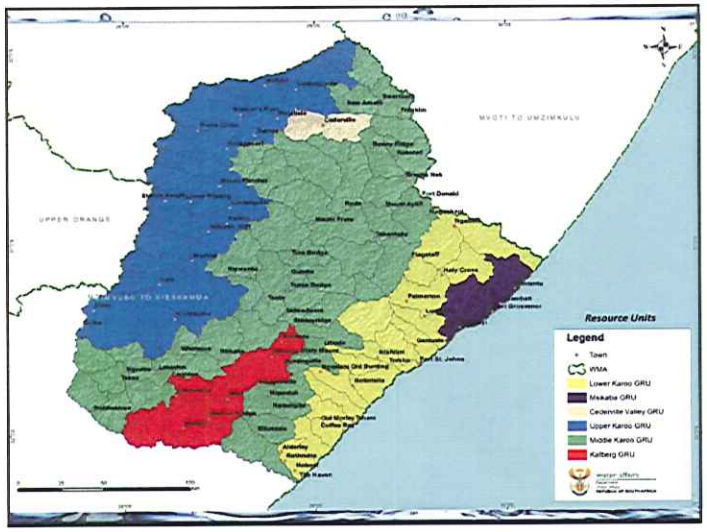
Catchment	Surface Area (km²)	MAP WR2005 (mm/a)	95% assured Rainfall (mm/a)	Ground water Recharge (%of MAP)	Recharge (Mm³/a)	Total inflow (Mm³/a)	Total outflow before losses Mm³/a	Evapo-transpiration flow loss (Mm³/a)	Net Baseflow (Mm³/a)	GYMR Index %(Total outflow/ Total inflow)
T60E	198	885	709	6.03%	8.47	8.47	-3.25	-2.39	2.82	38%
T60F	463	940	753	6.63%	23.13	23.13	-5.96	-5.23	11.94	26%
T60G	359	1116	895	8.29%	26.65	26.65	-2.21	-6.35	18.09	8%
T60H	322	1277	1024	9.90%	32.59	32.62	-7.88	-5.37	19.37	24%
T60J	293	1101	882	8.23%	21.31	21.31	-3.24	-4.72	13.35	15%
T60K	242	1075	862	7.50%	15.64	15.64	-3.36	-4.93	7.35	31%
Total study area	1151	1114	893	8.25%	84.77	84.81	-8.58	-20.49	55.74	10%

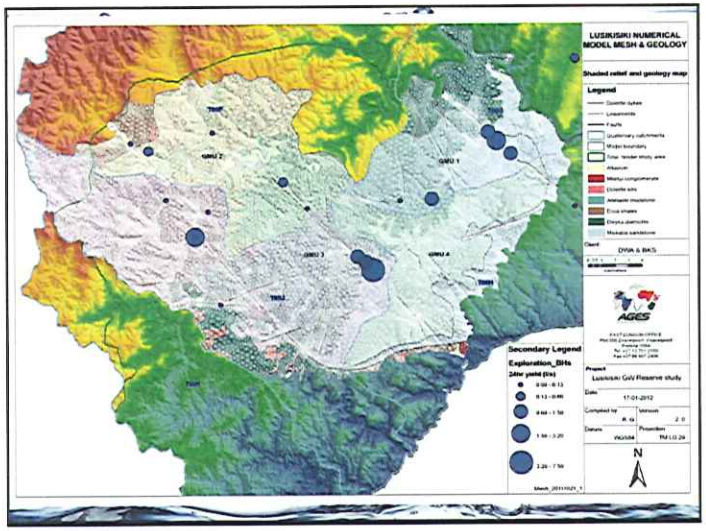


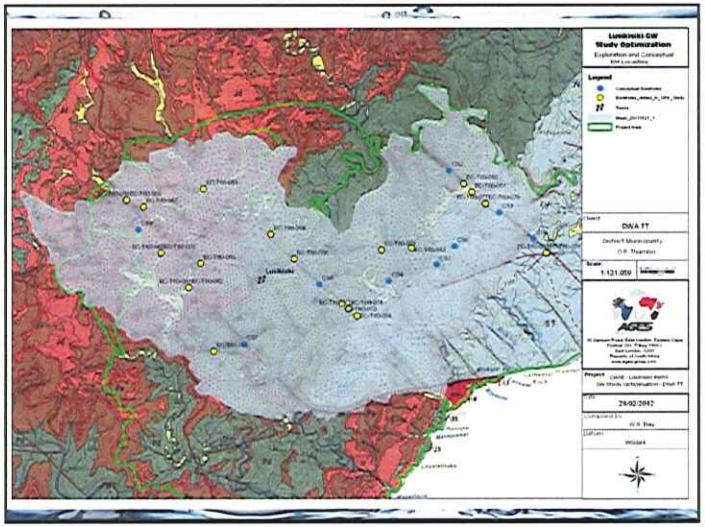
NUMERICAL GROUNDWATER MODELING

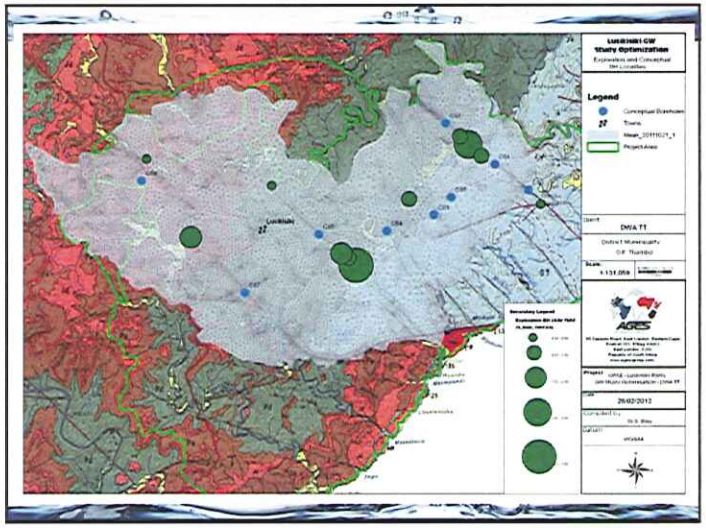
- Numerical groundwater flow model boundary delineated based on the following:
  - Watershed boundaries, rivers & quaternary catchment boundaries;
  - High yielding boreholes drilled during Lusikisiki groundwater feasibility study;
  - Groundwater Management Unit (GMU) boundaries delineated by SRK;
  - Lithological units and regional structures
  - Socio-economic considerations: Model boundary around existing pipeline network & boreholes to be linked in
  - Model area: 608.6 km2.









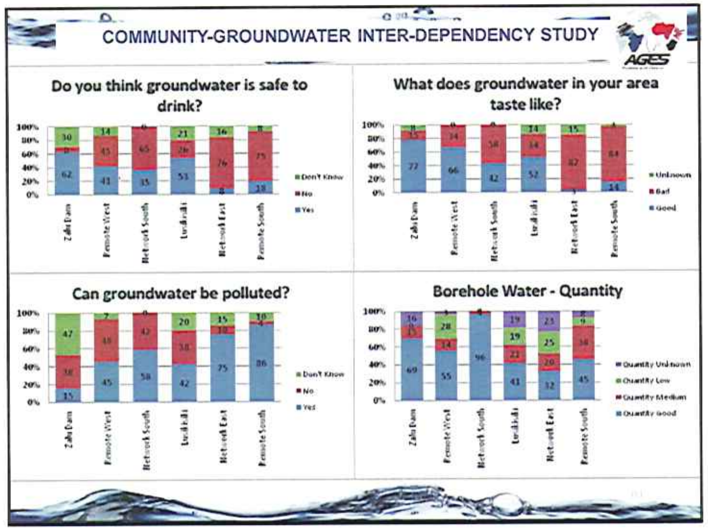


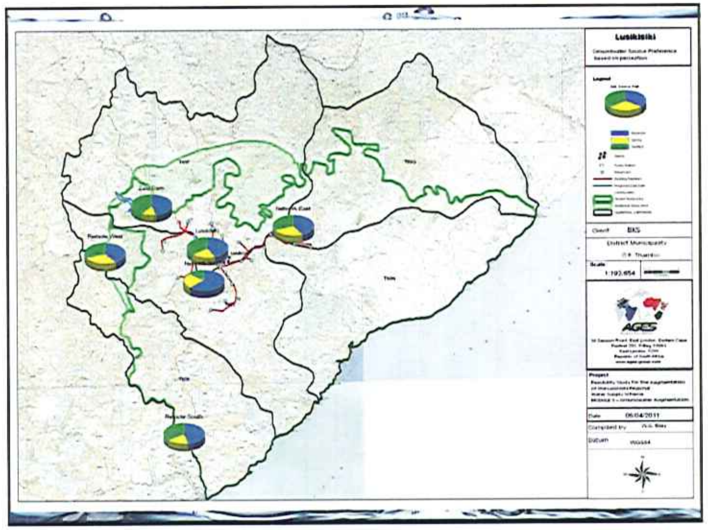
Exploration vs Additional Conceptual Boreholes

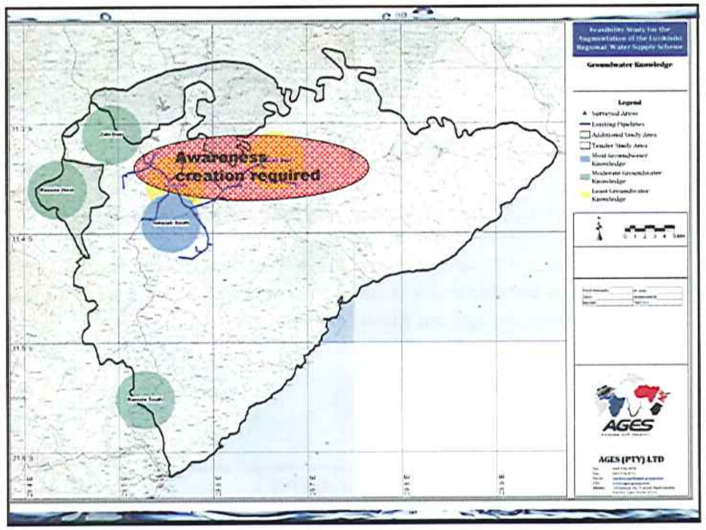
Site Name	Latitude	Longitude	Water Quality	Blow yield	24 hour Yield
EC-T60-051	-31,309080	29,759600	M - Iron	22	3.2
EC-T60-052	-31,303130	29,752830	M - Bacteria	2.75	0.89
EC-T60-053	-31,348550	29,708910	M - Bacteria	11	0.82
EC-T60-054	-31,396730	29,663070	Good	85	7.5
EC-T60-055	-31,391170	29,656990	Good	1.1	0.75
EC-T60-057	-31,316550	29,486600	M - Iron & chloride	1.6	0.34
EC-T60-061	-31,374490	29,523240	M - Chloride & Bacteria & Iron	22	2.3
EC-T60-064	-31,337440	29,592360	U - Iron & Bacteria	2.2	0.6
EC-T60-072	-31,387690	29,650720	U - Coliforms	5	1.5
EC-T60-076	-31,353420	29,820750	U - Iron & Bacteria	1	0.4
EC-T60-078	-31,317580	29,770800	Good	15	0.94
EC-T60-080	-31,331750	29,953830	M - Iron	2.5	0.51
			Total available volume from exploration boreholes developed(l/s)		19.8
			Nr of additional conceptual boreholes		9
			Estimated sustainble yield per new borehole (24hr l/s)		1.8
			Total available volume from conceptual boreholes developed(l/s)		16.2
			Total estimated volume to be evaluated against reserve and numerical model (l/s)		36

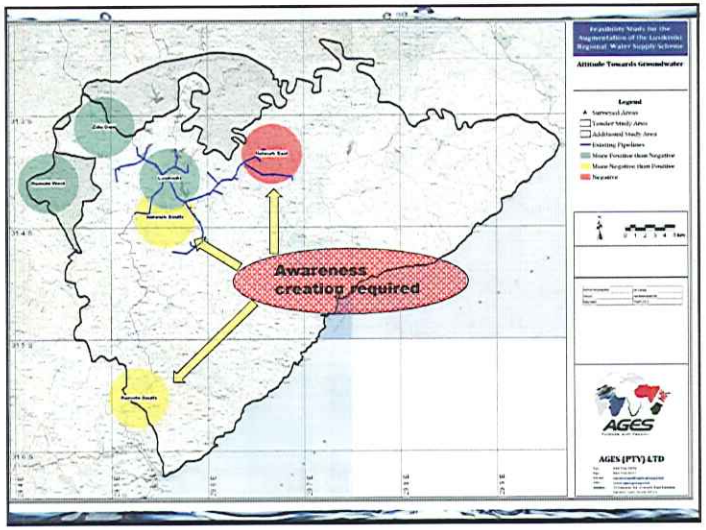
Well field Cost Modelling and augmentation

- Optimise borehole distribution network through numerical model outputs – borehole spacing
- Integrate with surface water infrastructure design team
- Define blending and augmentation scenarios
- Optimise storage and distribution networks
- Evaluate scenarios – Capex vs Opex
- Recommendations to report


COMMUNITY-GROUNDWATER INTER-DEPENDENCY STUDY
AGES
Do you think groundwater is safe to drink?
What does groundwater in your area taste like?
Can groundwater be polluted?
Borehole Water - Quantity
Zalu Dam
Remote West
Network South
Lusikisiki
Network East
Remote South
Don't Know
No
Yes
Unknown
Bad
Good
Quantity Unknown
Quantity Low
Quantity Medium
Quantity Good




Awareness creation required
AGES
AGES (PTY) LTD


Awareness creation required
AGES
AGES (PTY) LTD

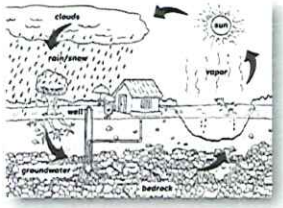
COMMUNITY-GROUNDWATER INTER-DEPENDENCY STUDY

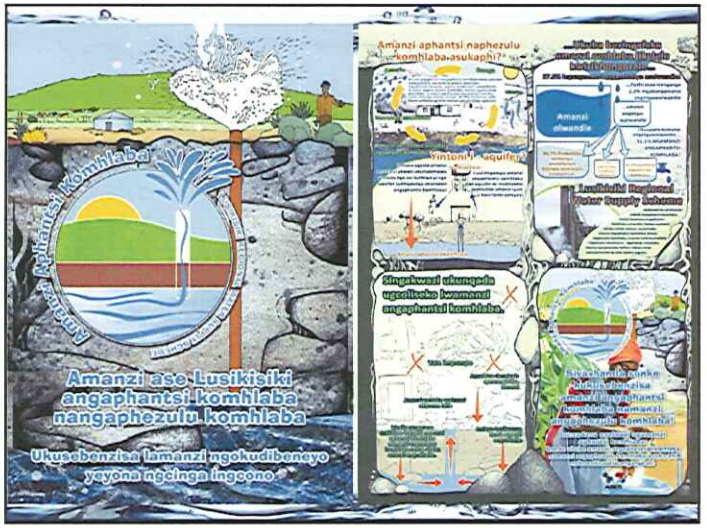
- The water awareness initiatives were conducted in four wards (wards 20, 21, 22, and 23), which had previously been identified as having:
  - the least groundwater knowledge, and
  - high negative perceptions and attitudes towards the use of groundwater as a water source, in a social survey conducted during phase 1 of the project
- As part of the awareness initiative:
  - two awareness workshops were conducted to relevant prominent community members,
  - three local schools were targeted
  - the local radio station, Nkonjane Community Radio, gave AGES a slot to broadcast knowledge on ground-and surface water use.

COMMUNITY-GROUNDWATER INTER-DEPENDENCY STUDY

- AGES's Social unit presented a groundwater awareness workshop that supported and enhanced the Lusikisiki project's institutional and social development. The purpose of the workshops were to increase project sustainability through creating awareness around conjunctive use of ground- and surface water and stimulate sensitivity within participants concerning the importance of conserving water.
- Continuous assessment techniques were employed to evaluate the water awareness workshops. Participants seemed to find a lot of enjoyment out of the activities that were used to bring across points during the workshop and the goals set for the programme were reached.

COMMUNITY-GROUNDWATER INTER-DEPENDENCY STUDY





WAY FORWARD

- Incorporate EWR values into final GYMR
- Integrate with Surface Water team - infrastructure design optimisation and blending scenarios
- Final Report
- DWA component to be integrated in Lusikisiki Report
- Target date – 31st March 2012

Thank You

MODULE 4: RESERVE

Patsy Scherman
Scherman Colloty & Associates

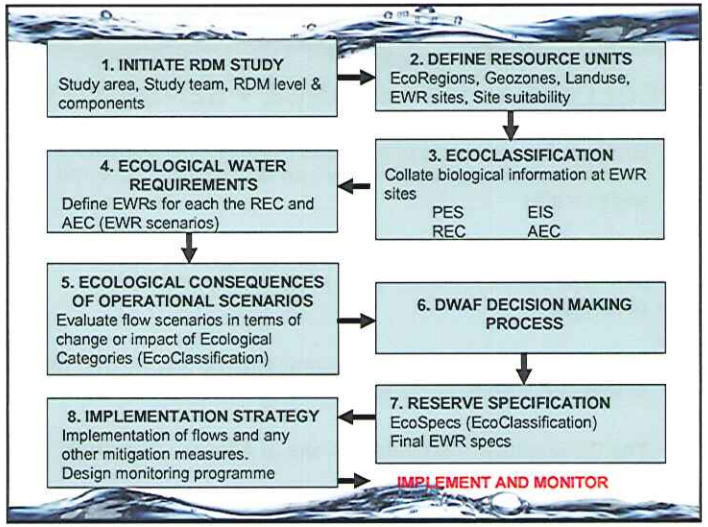
ECOLOGICAL RESERVE

- Specifies the **flow and water quality** requirements that are necessary to keep the water resource in a certain state of health
- Specifies not only amounts, but also the required **frequency and duration** of certain flows
- Also specifies the **condition** that **diatoms, fish, habitat, invertebrates, geomorphology and riparian vegetation** should be **managed for** in order to maintain or improve the overall health of the resource

LEVELS OF THE RESERVE

- Comprehensive
- Intermediate
- Rapid Level I, II and III
- Desktop, e.g. calculations of the water quality component of the Reserve for the purposes of a water quality license

- So distinguish between level of Reserve and confidence
- This study:
  - Intermediate Reserve (or EWR) study
  - Hydrological data of poor confidence
  - Two river sites, so not basin level
  - Estuary, groundwater, wetlands not included



ECOCLASSIFICATION

- Process to determine and categorise the Present Ecological State or (integrated) EcoStatus
- The state of each biological and driver component is determined compared to reference conditions (usually natural)
  - Drivers (physico-chemical, geomorphology, hydrology) provide a particular habitat template
  - Biological responses (fish, riparian vegetation and aquatic invertebrates)

Ecological State, or EcoStatus, is the totality of the features of the river and its riparian zone that enables it to support an appropriate natural flora and fauna

ECOLOGICAL CATEGORY	DESCRIPTION
A	Unmodified, natural.
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

ECOLOGICAL IMPORTANCE + SENSITIVITY

- **Ecological importance** of a water resource: its importance to maintain ecological diversity and function on local and wider scales
- **Ecological sensitivity:** a systems ability to resist disturbance and capability to recover from disturbance once it has occurred
- Determined for a series of determinants on a **scale of 0 to 4**; where 0 = no importance; 4 = very important
- The EIS results are provided as one of 4 levels: **Very High, High, Moderate** and **Low**

MODELS USED FOR ECOCLASSIFICATION

- Hydrological Driver Assessment Index
- Geomorphology Driver Assessment Index
- Physico-chemical Driver Assessment Index (PAI), using diatoms as a response indicator
- Fish Response Assessment Index (FRAI)
- Macroinvertebrate Invertebrate Response Assessment Index (MIRAI)
- Vegetation Response Assessment Index (VEGRAI)

EcoStatus consists of the individual objectives of each of the component categories used to derive the PES

EIS: Moderate

PES: C

Non-flow and Flow related impacts. Impacts related mostly to changes in flow regime due to operation of Grootdraai Dam.

REC: C

Maintain the PES due to the moderate EIS rating. Note there is a rare sp. present.

AEC up: B

Change in operation of dam with more natural seasonal patterns.

AEC down: C/D

Less spilling (less floods) and decreased base flows

IHI				Driver Components	PES and REC Category	Trend	AEC↑	AEC↓
INSTREAM	D	RIPARIAN	C	HYDROLOGY	D			
				WATER QUALITY	B/C	Negative	B	B/C
				GEOMORPHOLOGY	D	Stable	D	D/E
				Response Components	PES Category	Trend	AEC↑	AEC↓
				FISH	C	Stable	B	D
				MACRO INVERTEBRATES	C	Stable	B/C	C/D
				INSTREAM	C		B/C	C/D
				RIPARIAN VEGETATION	B/C	Stable	B	C
				ECOSTATUS	C		B	C/D

SETTING FLOW REQUIREMENTS

- **Habitat Flow-Stressor Response** method
  - Focus on relationship between flow, hydraulic parameters and the responses of instream biota
  - Application of a generic stress index to describe consequences of flow reduction
  - stress requirements must be provided as a stress required for a specific duration for different Ecological Categories
- **Two** stress requirements are essential (at least)
  - **Drought stress:** 5% stress equalled or exceeded
  - **Maintenance stress:** ?% stress equalled or exceeded (% depends on the type of river you are dealing with and reflects the natural hydrological variability)

FINAL FLOW REQUIREMENTS

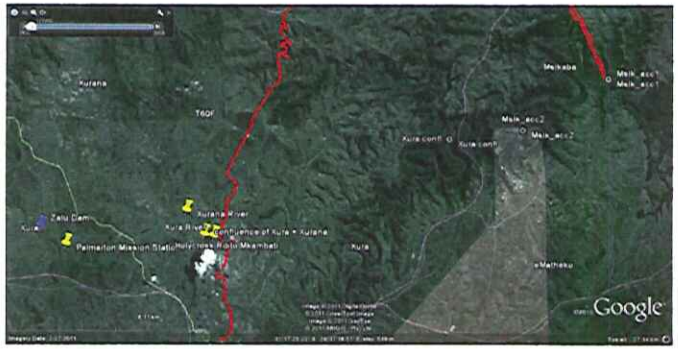
- Low flows = lowest stress for the biotic group at a specific duration. Veg + geomorph check that their requirements are catered for.
- High flows:
  - Determine sizes of floods and their functions within different flood classes (class 1 the smallest)
  - Determine the required number of events of each different floodclass for each different EC
  - Motivate
- BIGGEST ISSUE IS LACK OF DAILY HYDROLOGY (ESPECIALLY NEEDED FOR HIGH FLOW DETERMINATIONS)

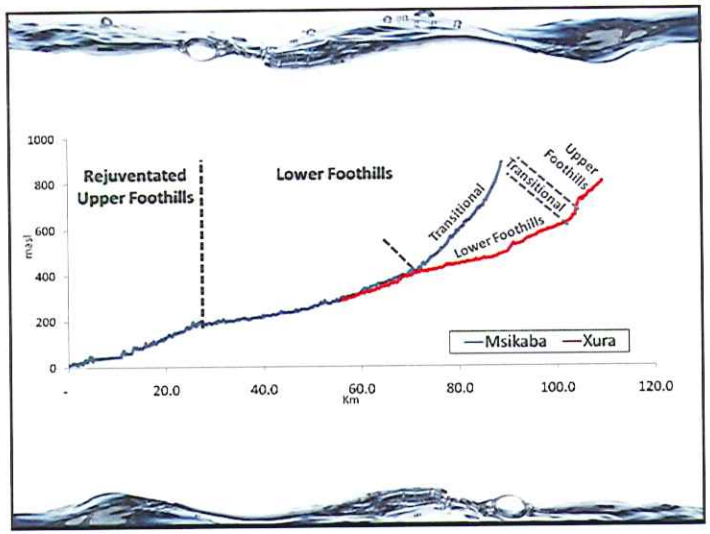
RESERVE PROCESS: STEPS 5-8

- Scenario evaluation
- Socio-economic implications
- Defining EcoSpecs and TPCs
- Present results to DWA
- Design monitoring programme
- Prepare Reserve template
- Additional tasks, e.g. design operational rules for dams → IMPLEMENTATION

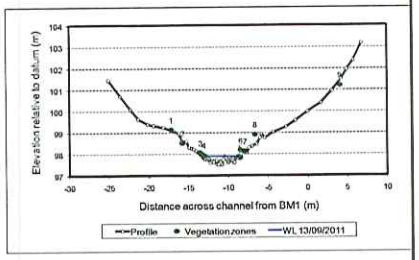
SITE SELECTION + SURVEYS

- Planned for June 2011; postponed to August 2011
- Site selection (Louw, Scherman, Colloty): 11 Sept. 2011
- Sites assessed
  - Msikaba access 1
  - Msikaba access 2 √
  - Xura (two sites downstream proposed dam)
- Biol/phys survey 1 + hydraulics: 12-15 September 2011
- Biological survey 2: Inverts and fish - February 2012
- High flow (?) hydraulic survey: 6-8 March 2012

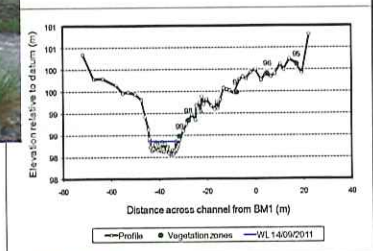




XURA RIVER



MSIKABA RIVER



FIRST ESTIMATE OF RESERVE

	Xura River, EWR 1	Msikaba River, EWR 2
• Fish	B	B
• Invertebrates	B	B/C
• Vegetation	B → B/C	C → C/D
• Geomorphology	no info yet	no info yet
• Water quality	A/B	B

No models have been run as field work incomplete. Estimate therefore based on one field survey and qualitative assessment ONLY. Specialist workshop end April 2012 → PES, EIS, REC, AECs + EWR flows

TASK DESCRIPTIONS	2010 Oct-Dec	2011 Jan-Mar	2011 Apr-June	2011 July-Sept	2011 Oct-Dec	2012 Jan-Mar	2012 Apr-June	2012 July-Sept	2012 Oct-Dec	2013 Jan-Mar
TASK 1 - PROJECT MANAGEMENT										
1.1 Technical + Financial Management	X	X	X	X	X	X	X	X	X	X
1.2 Preparation of the Inception Report	X	X								
1.3 Management meetings	X		X				X			X
1.4 Input to RID	X									
TASK 2 - RESOURCE UNITS										
2.1 Geomorphological zoning		X								
2.2 Ecoregions (No cost)		X								
2.3 Water quality sub-units	X	X								
2.4 Land use		X								
2.5 EWR site selection + survey				X						
(Incl. input to report)										
2.6 Delineation Report						X				
TASK 3 - RIVER ECOCLASSIFICATION										
3.1 Management + coordination		X	X	X	X	X				
3.2 Field survey						X				
(Additional hydraulic surveys)						X				
3.3 Data analysis + reporting					X	X	X			
3.4 EcoStatus workshop							X			
TASK 4 - DETERMINATION OF EWR SCENARIOS										
4.1 Preparation of EWR hydrology		X			X	X				
4.2 Hydraulic modelling						X	X			
4.3 FSR EWR workshop							X			
TASK 5 - DETERMINING RIVER ECOLOGICAL CONSEQUENCES										
5.1 Including scenarios in yield model							X			
5.2 Running op scenarios through yield model							X			
5.3 Scenario workshop							X			
5.4 RDM Report			X					X		
TASK 6 - SOCIO-ECONOMIC CONSEQUENCES									X	
TASK 7 - MSIKABA ESTUARY SCOPING ASSESSMENT										
7.1 Specialist workshop								X		
7.2 Msikaba Estuary Scoping Report								X	X	
TASK 8 - MONITORING & ECOSPECS									X	
PRESENTATION TO DWA									X	
TASK 9 - TERMINATION AND MAIN REPORT										
9.1 Preparation of the Main Report										X
9.2 Preparation of Reserve template										X
9.3 Presentation of results at workshop + input to newsletter										X

Note survey dates are flow-dependent

REVISED TIMING - February 2012

Task 7: additional task to be included in EIA (still provisional)

5.5: Module 6: Water services infrastructure

water affairs
Department: Water Affairs
REPUBLIC OF SOUTH AFRICA

Lusikisiki Feasibility Study

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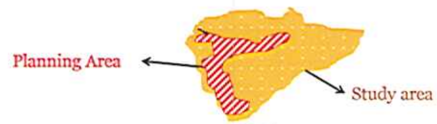
Distribution infrastructure

- Available reports were reviewed
  - Investigating the Potential to Supplement LRWSS – May 2009 (SRK)
  - Module 3 – Groundwater Augmentation Presentation – 14 April 2011
  - Module 5.1 – Domestic Water Requirements Report – August 2011
- Areas to be investigated for distribution infrastructure
  - Planning Area – This area is directly influenced by the proposed Zalu dam
  - Study Area – This is the Tender Study Area, and includes the Planning Area.



Summary of water requirements

Domestic Requirements (million m³/annum) for Study Area

Scenario	2010	2015	2020	2025	2030	2035	2040
Low Growth	6.80	7.00	7.10	7.20	7.30	7.30	7.40
Medium Growth	6.80	7.10	7.40	7.80	8.10	8.50	8.90
High Growth	6.80	7.20	7.80	8.60	9.30	10.10	10.90

Domestic Requirements (million m³/annum) for Planning Area

Scenario	2010	2015	2020	2025	2030	2035	2040
Low Growth	3.45	3.56	3.61	3.66	3.71	3.71	3.76
Medium Growth	3.45	3.61	3.76	3.96	4.11	4.32	4.52
High Growth	3.45	3.66	3.96	4.37	4.72	5.13	5.54

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Water balance for planning area

Wall Height (m)	MAR (10^6 m³)	Historic firm yield with EWR (Mm³/a)	High Growth (Mm³/a)	Surplus / Deficit (Mm³/a)	Medium Growth (Mm³/a)	Surplus / Deficit (Mm³/a)	Low Growth (Mm³/a)	Surplus / Deficit (Mm³/a)
25	0.50	3.95	5.13	-1.18	4.32	-0.37	3.71	0.24
30	0.80	5.12	5.13	-0.01	4.32	0.80	3.71	1.41
32	1.00	5.74	5.13	0.61	4.32	1.42	3.71	2.03
34	1.20	6.41	5.13	1.28	4.32	2.09	3.71	2.70
35	1.30	6.72	5.13	1.59	4.32	2.40	3.71	3.01

- Zalu Dam cannot provide for the whole of the study area – require groundwater augmentation
- Zalu Dam can provide sufficient yield for the planning area
- An economic optimum size need to be find

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Way forward (1)

- Mapping of the following *(end of Feb 2012)*:
  - All the existing bulk supply distribution infrastructure
  - Proposed boreholes to be developed
  - Towns and Villages
- Identification of Town and Villages that can be supplied with water from *(end of Feb 2012)*:
  - Zalu Dam only
  - Ground Water Resources only
  - Both Zalu Dam and Ground Water Resources

Way forward (2)

- Optimise options by comparing water supply from
  - Zalu Dam only
  - Ground Water Resources only
  - Both Zalu Dam and Ground Water Resources
- Investigate, and costs, the Proposed Bulk Water Distribution Infrastructure Options in order to derive URVs and Cost Curves
- Recommend the most feasible option to DWA for Preliminary Design – aimed for end April 2012

6.2 Water Quality: Review of surface water quality data

- Six grab samples were taken from the Xura River upstream of the proposed Zalu Dam wall (2009 study)
- results indicated quality of intake water to the proposed Zalu Dam is generally good
  - exception of Total Iron and Total Coliform.
- DWA takes water samples at Gauging Weir T6H004, on the Xura River, for testing - most recent samples taken during February 2010

DWA Water Quality Data – T6H004 on the Xura River

Determinant	Units	Standard*	Min	Avg	Max
Conductivity at 25°C	mS/m	≤ 170	9.4	21.8	34.2
Dissolved solids	mg/ℓ	≤ 1 200	61.3	141.8	222.3
pH value at 25°C	pH units	5.0 – 9.7	6.7	7.6	8.5
Ammonia as N	mg/ℓ	≤ 1.5	0.015	0.2	0.4
Calcium as Ca	mg/ℓ	< 150	2.8	14.8	26.7
Chloride as Cl	mg/ℓ	≤ 300	5.2	20.9	36.6
Fluoride as F	mg/ℓ	≤ 1.5	0.050	0.1	0.2
Magnesium as Mg	mg/ℓ	< 70	2.7	10.2	17.6
Nitrate/Nitrite as N	mg/ℓ	≤ 11/0.9	0.020	1.1	2.2
Orthophosphate as P	mg/ℓ	-	0.006	0.4	0.8
Potassium as K	mg/ℓ	< 50	0.2	1.4	2.6
Sodium as Na	mg/ℓ	≤ 200	5.1	15.3	25.5
Sulphate as SO_4^{2-} (Acute health-1)	mg/ℓ	≤ 500	1.9	13.5	25.1
Sulphate as SO_4^{2-} (Aesthetic)	mg/ℓ	≤ 250	1.9	13.5	25.1

Lusikisiki WTW Site visit: Raw and Treated Water Analysis

Determinant	Units	SAB'S Class 1	Sample Description	
			Raw	Treated Final
Colour Unfiltered	mg/ℓ Pt	< 20	416	40
Colour Filtered	mg/ℓ Pt	< 20	355	13
Conductivity at 25°C	mS/m	< 150	17.5	17.3
Dissolved solids	mg/ℓ	< 1 000	123	136
pH value at 25°C	pH units	5,0 – 9,5	7.4	6.4
Turbidity	NTU	< 1	43	5.1
(Nitrate and nitrite) as N	mg/ℓ	< 10	0.8	-
Total Alkalinity	mg/ℓ as $CaCO_3$	> 50*	44	36
Iron as Fe	µg/ℓ	< 200	962	96
Manganese as Mn	µg/ℓ	< 100	< 25	< 25
Dissolved organic carbon as C	mg/ℓ	< 10	1.1	1.5

- Colour & turbidity influence the aesthetic quality of the water
- Low turbidity required for effective disinfection
- Low alkalinity levels lead to corrosion of mechanical equipment & distribution networks

Grab samples on 2 August 2011 analysed by Waterlab

**not an SABS requirement, but important to prevent corrosive action*

Water Quality conclusions

- Water quality at Zalu Dam is good
  - Address water quality issues due to damming of water during design of dam
- Proposed sampling frequencies
  - Xura River: 2 weekly
  - WTP effluent: 2 weekly

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Status Quo of existing Water Treatment Plant (WTP)

- Previous reports : treatment capacity at the existing WTP to be about 2.8 Ml/day.
- Operator confirmed (site visit of 02 August 2011) current flow to the WTP : approximately 3.7 Ml/day.
- The water treatment capacity of the scheme is required to be increased to meet the High Growth Scenario over the 30 years design horizon
  - 12 Mℓ/day for the Planning Area
  - 23.5 Mℓ/day for the Study Area
    - if the supply is from surface water resources (Zalu Dam) only.

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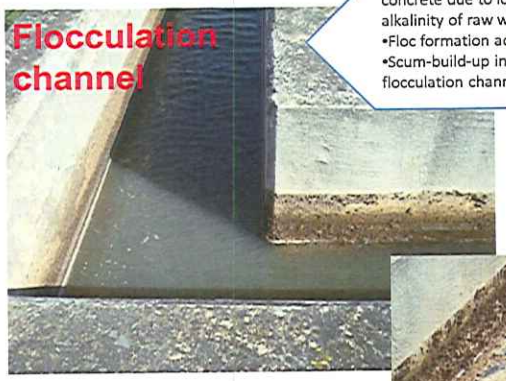
Lusikisiki WTW Site visit – August 2011

- WTW site generally well maintained
- Fencing in well maintained condition
- Operator helpful

Inlet from Xaru River and chemical dosing

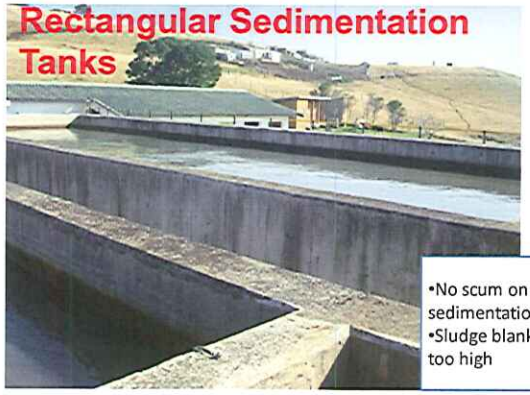
- Corrosion evident on concrete due to low alkalinity of raw water
- Dosing rate of coagulant/flocculent uncertain
- Mixing of coagulant/flocculent adequate

Flocculation channel



- Corrosion evident on concrete due to low alkalinity of raw water
- Floc formation adequate
- Scum-build-up in flocculation channels

Rectangular Sedimentation Tanks



- No scum on sedimentation tanks
- Sludge blanket not too high

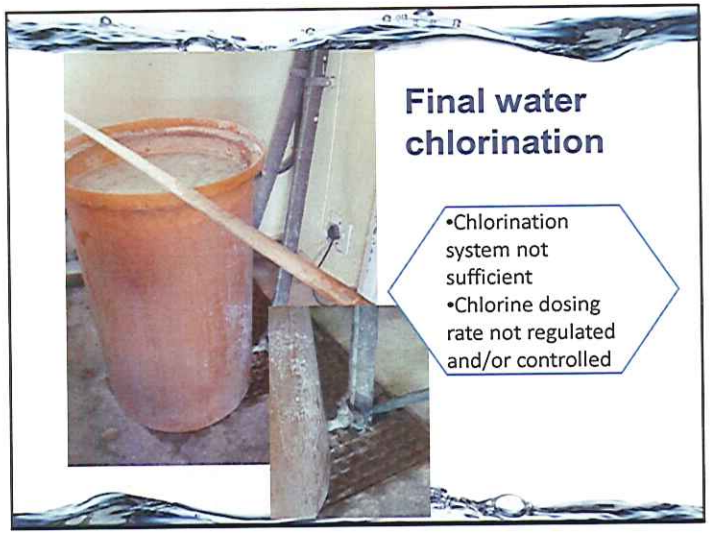
Storage basin after sedimentation and before filtration

- Lining of storage basins in good condition

- Pumps all in working order
- All equipment generally well maintained

Pressure filters & pipework

- Filters all in working order
- All equipment generally well maintained



Extension of WTP

- The upgrading of the scheme will involve the selection of water treatment processes that must take the expected future water quality into account
- A phased approach should be investigated in terms of future treatment requirements
  - Future capacity requirement
  - Raw water sources and quality
  - Incorporation of existing WTP

5.6 Module 10: Environmental screening

Overview of the affected environment

- Biophysical
  - Geology and soils
    - From hard quartzite rock of Natal Group Sandstones to tillite, shale, mudstone and sandstone of Karoo Sequence
    - Suitable geological investigations to ensure adequate design
    - Construction may result in soil erosion
  - Topography
    - Inland rolling hills to deeply incised river valleys
  - Terrestrial ecology
    - Vegetation at dam Ngongoni Veld
  - Riverine ecology
    - Widespread man-induced impacts on riverine habitats and loss of natural habitats
  - Estuarine ecology
    - Msikaba River deepest estuary along South African coast: 39 m deep

Overview of the affected environment

- Social
  - Water quality
    - Construction activities may impact quality of Xura River
  - Heritage
    - Currently no records of archaeologically significant sites – area has not been surveyed.
  - Displacement of persons
    - No indication of displacement of people, but loss of land
  - Health and safety
    - Concern about the influx of contract workers – risk of HIV/AIDS
    - Access roads cross rural communities: risk of accidents caused by construction vehicles
  - Access roads
    - Temporary and permanent access roads
  - Visual impact
    - Short term construction related impact
    - Long term dam wall and basin impact

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Overview of the affected environment

- Economic
  - Local income
  - Social environment
    - Will be dealt with in the Economic impact assessment
- Enviro-legal risk assessment
  - Variety of applicable legislation and regulations

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Outcome

- No fatal flaws identified
- Concerned about the estuary
  - Estuary Reserve included in EIA study
- Area of the dam basin
  - Less sensitive
  - EIA to consider possible red data species
    - *Scadoxus puniceus* and *Harpephyllum caffrum*
  - Possible negative impact on Health & Safety of local communities
- Access roads
  - Impact on grasslands and safety of locals

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Outcome (2)

- Recommended studies for EIA
  - Faunal impact assessment
  - Detailed site-specific environmental investigations
    - Require detail info on dam design, areas to be inundated, construction methods, associated infrastructure
  - Groundwater and reserve requirements
  - Social impacts (including the possible displacement of people)
  - Heritage impact assessment

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Module 10: Environmental screening

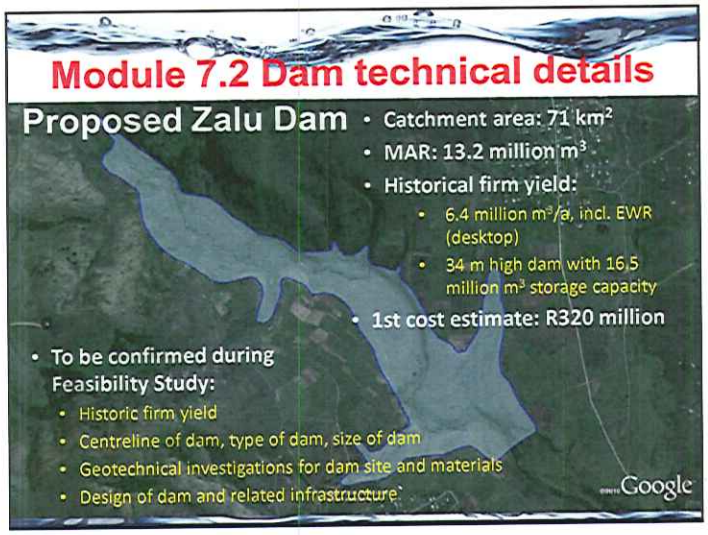
- Progress:
  - Draft screening report submitted to DWA and PMC
    - Await comments
  - EMPr included in Geotechnical investigation tender
  - Scope of Work for EIA task submitted to DWA
    - Await procurement of EIA PSP

5.7 Other modules

Module 7.1 Site investigations

- Procurement of Drilling Contractor
  - Tender period: 16 Nov to 2 December 2011
  - Three bidders submitted tenders
  - Evaluation report was submitted to Client on 12 Dec 2011
  - Need urgent approval for drilling to go ahead

Module 7.2 Dam technical details



Other modules

- Module 8: Cost estimate & comparison
  - Not started – await dam design
- Module 9: Regional Economics
  - Initial data obtained
  - Await dam design and costing
- Module 11: Public Participation
  - 2nd SC will be held on 29 February
  - www.dwa.gov.za/Projects/Lusikisiki
    - Background, Study area, Stakeholder engagement, Documents, Contacts

Other modules

- Module 12: Legal, institutional & financial arrangements
  - Await dam design and costing
- Module 13: Record of Implementation Decisions
- Module 14: Main report

6. Ingquza Hill LM Detailed Feasibility Study
7. General
8. The way forward
9. Date for next meeting
10. Closure

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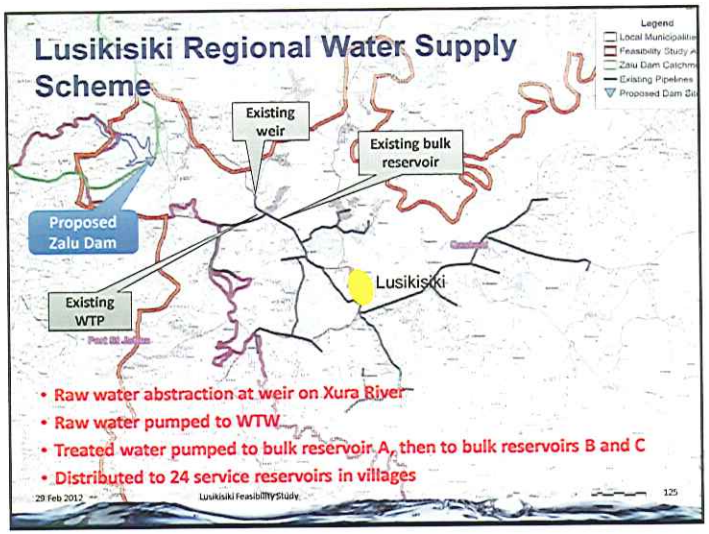
THANK YOU


Lusikisiki Regional Water Supply Scheme
Existing weir
Existing bulk reservoir
Proposed Zalu Dam
Existing WTP
Lusikisiki
Legend
• Raw water abstraction at weir on Xura River
• Raw water pumped to WTW
• Treated water pumped to bulk reservoir A, then to bulk reservoirs B and C
• Distributed to 24 service reservoirs in villages
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